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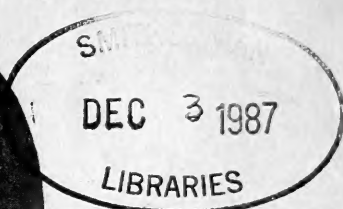
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No. 1

THE BUTTERFLY FARMER

A MONTHLY MAGAZINE FOR
AMATEUR ENTOMOLOGISTS

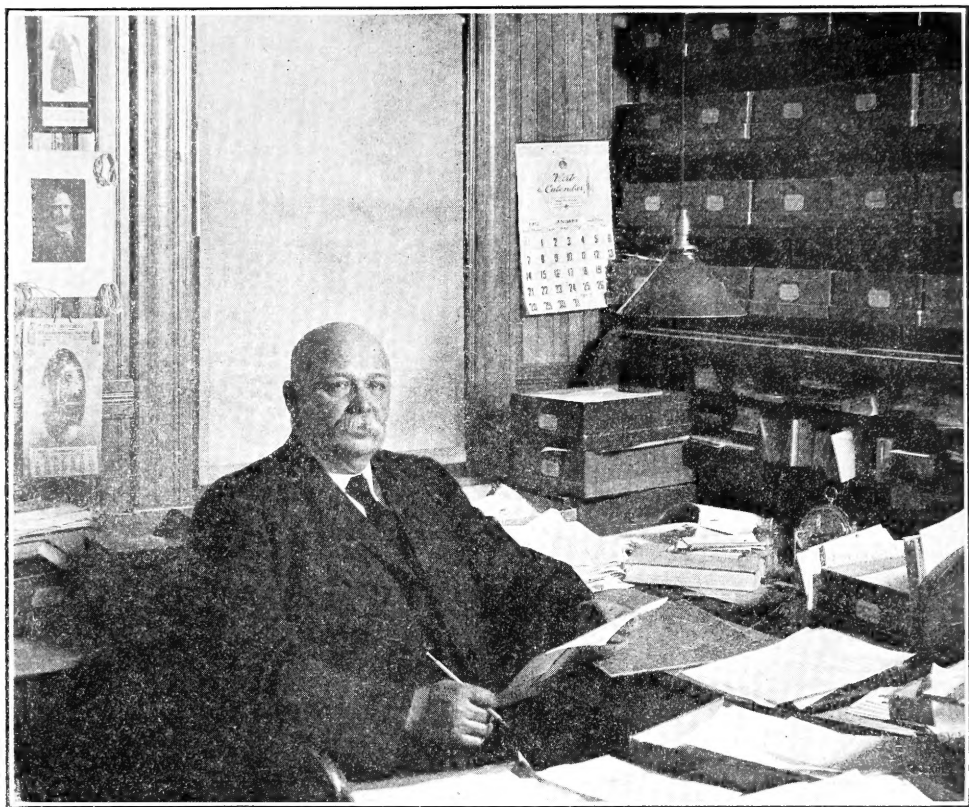


XIMENA McGLASHAN
Publisher and Proprietor
TRUCKEE, CALIFORNIA

*A Comprehensive Correspondence Course in Entomology,
Conducted Under the Auspices of The Agassiz Association,
Will Be a Leading Feature During the Ensuing Year.*

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DR. EDWARD F. BIGELOW.

Nature Lovers need not be told of the Agassiz Association. It is everywhere recognized as one of the most powerful forces which has caused the present wave of nature study to spread over our land. Founded in 1875, it had in 1890 one thousand "Chapters" and a membership of more than thirty thousand. Its phenomenal growth during each successive year has made the institution of such vast proportions that it needs no introduction.

Dr. Edward F. Bigelow, President of the Association and Publisher of *The Guide to Nature*, its official organ, has taken the warmest interest during the past year in my plan of giving free instruction to amateur entomologists, and kindly permits the correspondence course to be published under the auspices of the Association. I am very proud to claim membership in the Agassiz Association and accept his offer with a grateful appreciation of the distinction it confers.

Full particulars regarding the objects of the Association may be obtained by addressing "Edward F. Bigelow, Arcadia, Sound Beach, Conn." The *Guide to Nature*, subscription price \$1.00 a year, is recommended to all correspondents.

We are pleased to present the reproduction of a photograph of Dr. Bigelow sitting at his office desk.

ANNOUNCEMENT.

The Butterfly Farmer will be devoted to the wants of the beginner, the nature lover, the enthusiastic amateur. It is a cold fact that beginners in entomology can glean but scanty directions from the costly scientific entomological works. Scientific authors seem to forget to tell the thousand and one little simple things that puzzle the beginner. Last year I gave free circular instructions in butterfly farming to one thousand correspondents. Two thousand people have asked for instruction. I am nineteen years old and with the money I have made from butterfly farming am attending the University of California. The only way I can teach enquirers is by means of a monthly magazine. Half a hundred scientists have pledged themselves to assist me in this work. My Father, Gen. C. F. McGlashan, has agreed to act as my business manager and associate editor. The correspondence course, with the exception of the contributions, which will be made by entomologists, was prepared before I entered college. I feel that I am offering virtually free instruction to all who wish to learn the business, for the subscription price of \$5.00 barely covers the estimated cost of publication, distribution and incidental expenses. If I could afford to do so I would teach all applicants absolutely free of charge, for I consider butterfly farming the most beautiful, fascinating, enchanting avocation ever discovered.

A sample copy of The Butterfly Farmer will be sent to all my correspondents with the promise that if they send one year's subscription I will guarantee to teach them, with the aid of my scientific friends, the business of butterfly farming.

BUTTERFLY FARMING.

Butterfly farming, strictly speaking, includes only the propagation of moths and butterflies, caring for eggs and pupæ and raising the larvæ. To carry on the business, however, one must have female moths and butterflies in order to secure eggs, must have males and females to mate, and in order to secure these the work is broadened. The butterfly farmer must understand how to use the net, sugar, take specimens at light, upon flowers and by all approved methods. He must know how to search for eggs, caterpillars and cocoons and must become a first class collector. He must know how to preserve specimens, pin moths, paper butterflies, spread and mount all sorts of insects, pack specimens for shipment, relax dried specimens, and must acquire a vast number of trade secrets with which the experienced entomologist is familiar. In order to make this business yield its greatest profits one should know something about collecting coleoptera and other orders of insects, for valuable species of these may be frequently captured without at all interfering with the pursuit of lepidoptera. There are specialists of one sort and another who are willing to pay reasonably for perfect specimens of almost every description. Some of these wish dragon flies, bees, ants, bugs, leaf-borers, beetles, and everything that flies, creeps or crawls. One frequently makes trips when butterflies and moths cannot be found, and on such trips it may be desirable and practicable to take every choice specimen of the insect world which is encountered. To be a successful butterfly farmer one must understand a little of all branches of collecting. Lastly, he must thoroughly familiarize himself with the correct names of all the butterflies and moths of his particular locality, and must learn to correspond with dealers who desire his specimens.

MATING LIVE BUTTERFLIES.

By Prof. John H. Gerould
of the Department of Biology, Dartmouth College.

No elaborate outdoor quarters are needed for keeping and mating live butterflies. The air of the laboratory needs only to be fresh and fairly moist, as that of the ground-floor rooms of large buildings of brick or stone is likely to be in summer. The parched air of a steam heated room, or of one upon an upper floor and flooded with direct sunlight, is more fatal to butterflies than complete absence of food in a moist atmosphere. Bottomless cages 15 inches in length and breadth and 10 inches high, consisting of a simple frame of pine strips covered inwardly with cotton mosquito netting, are of ample size for *Colias philodice*, serving as a vivarium for the pupæ, as an enclosure for mating, and as a cage for the female during egg-laying, if the foodplant is small enough to be covered by a frame of this size. The use of wire screening is not to be recommended for adult butterflies, as it soon wears out and disfigures the wings that beat upon it. A frame of this sort covered with cheese cloth, or better with the material known by milliners as frame covering, makes an excellent breeding cage for even the youngest larvæ.

The larger the cage, the smaller are the chances that two individuals will meet. I began my experiments by turning butterflies loose in a large screened veranda, strongly lighted only on one side. Under such conditions their attraction towards the light absolutely controlled them. Each went his or her own way, paying not the slightest attention to the others. If several males and females of the same species are placed in a cage of the dimensions noted above (10 inches high and 15 inches square) or 15 inches in all three dimensions, and kept in the direct sunlight, or, if the temperature is high enough, in strong diffuse light, some matings may be expected. As soon as a couple are mated they should be removed to a separate cage, and their numbers noted. Mating continues in *Colias philodice* for over an hour, usually for about an hour and a half, and often two or three hours, so that there is little danger of promiscuity when large numbers of both sexes are placed in the same cage, if properly watched. One male often can be mated on successive days with several females.

*Papilio*s need large cages, 6 feet square or such a matter for mating, and the cages need to be shaded. Otherwise the occupants will not come to the foodplant but will beat against the top of the cage and pay no attention to their food, i. e. moistened boquet. Of course a wild *Papilio polyxenes* will deposit her eggs on carrot or parsley while enclosed in a small cage, 18 inches square for example. For mating, the larger cages seem necessary. For *Papilio turnus* I build a cage 6x6x12 feet over young hop trees (*Ptelea*.)

A GIRL TEACHING BEGINNERS.

Edward F. Bigelow, President of the Agassiz Association, writes:

"You are surely situated to do a great amount of good work in instructing young people and I believe that you will have great influence with them. The reason we are thoroughly desirous of helping you is because I think your lessons will be more instructive than coming from older naturalists. In the nearby town of Stamford, a banker requested me to refer him to some young person who could walk with his children and some of the neighbor's children. I offered him my own services and he said, 'Oh, no, that would not do. The

young people would think that was merely your work. We want inspiration to come to boys and girls through a boy or a girl.' Now I think that is just the situation with you. You can have a greater influence with boys and girls than can one hundred professors and we want to see your work develop the best way possible."

A SCIENTIST'S VIEWS.

J. Rennselaer Smith, M. D., Milpitas, Cal., has helped me during the past year by sending me books, literature, notes, records, splendidly written articles, giving me the names of correspondents, encouraging me when I felt misgivings, sending me all kinds of specimens, writing me helpful letters, teaching such of my correspondents as visited him, and now writes:

"A correspondence course would certainly suit me. Every one has a little different experience, and how helpful it would be to all to get each other's views. Often we are helped by others' failures. You have put the probable cost of a year's instruction at a low figure, \$5.00 per year. You could not think of carrying all the burden of necessary expense. You may start my name as number one and I will pay in advance."

HOW TO DETERMINE THE SEX OF BUTTERFLIES AND MOTHS.

The male moth is told from the female, at a glance, by the shape of the body, the male having a little tuft of hair at the end of the tail, while the end of the female's body is round and pointed. This rule has exceptions, but not many. The body of the female is often "fat" with eggs, and the shape designates the sex. Sometimes the coloring of the male is very different from that of the female. The body of the female is usually larger than that of the male.

WANTED: SPECIES OF COLIAS.

Prof. John H. Gerould of the Department of Biology, Dartmouth College writes:

"I have bred *Colias* (*Eurymus*) *philodice* on a rather large scale to determine how the white color variety is transmitted from generation to generation and am at work now on the same problem in *eurytheme* with stock from Arizona. I have also crossed these two species. I shall be interested next year in getting stock of other species to hybridize with these and judge that you are in a position to be able to give me a good deal of assistance with the Western species. I shall be very glad to get a list of those that occur in your locality. A price-list of mounted specimens, or in papers unmounted, would be acceptable.

"In a recent pure culture of *eurytheme* from a white female I got a hemaphrodite, chiefly male, with the male color pattern, the right front wing, however, having the female color pattern, with the ground color a mosaic of white and orange. The same strain, inbred may give more of this sort, though the individual itself left no progeny. White clover is the food I use for both species. I have a large number of cultures of various sorts now growing."

THE FOODPLANT CHARTS.

At the very outset of my work in butterfly farming the discovery was made that there is no such thing published as an up-to-date list of the foodplants of the larvæ of moths and butterflies. Such a list is an absolute necessity. W. C. Dukes of Mobile, Alabama, was the first to call my attention to the lack of such a list. He wrote: "If you will pardon the 'nerve' of a stranger, I would offer a suggestion that is in connection with your work. There would be a good opportunity to formulate a list of the foodplants of the different genera of moths and butterflies. There is no such work extant, so far as I know, and I think such a work would fill a want, and meet with sufficient demand to warrant publication." With the assistance of many of the foremost Entomologists such lists were prepared last year and was sent out as circulars 6 and 8, of the free correspondence course. A large edition of these was printed and I shall be pleased to send them, prepaid, to each subscriber who has not already received them. I shall also be glad to mail them to all scientists who have bred lepidoptera. A vast number of additions and corrections have been made to these charts by my correspondents and in due time revised charts will be published.

SOUTH AMERICAN HUMMING BIRD SKINS.

A correspondent from South America sends me large numbers of very beautiful humming bird skins properly prepared for the taxidermist, which I can sell at a reasonable figure. I shall be pleased to learn the name of dealers who handle such material.

SOUTH AMERICAN BUTTERFLIES.

A correspondent in Bogota is sending me magnificent specimens of South American Lepidoptera. I do not know the prices paid for such material nor do I know the names of purchasers. It will be a favor if any of you can assist me in marketing such specimens.

THE BEAUTIFUL IN ENTOMOLOGY NEGLECTED.

During the past quarter of a century the practical side of entomology has received almost the exclusive attention of scientists. The aesthetic and beautiful has been abandoned to those individuals who were forming collections, and to the poorly paid collectors who actually secured the specimens. Nearly all the graduates of the universities who studied entomology have turned their attention solely to insects injurious to agriculture, viticulture and horticulture. The courses taught in colleges have generally been confined to these topics. The enemies and parasites of butterflies and moths have been bred by state and nation, and educated scientists have been offered remunerative positions in great insectaries for this purpose. The state and federal institutions expend millions of dollars annually to destroy the larvæ of lepidoptera.

During the last few years, however, nature studies have been taught in all schools, nature study classes have been formed among the intelligent people in almost every community and scores of able writers have published books for nature lovers. The brilliantly colored specimens, the marvelous transformations of the butterfly and moth have led thousands and thousands of

nature lovers to study the aesthetic side of the science. It is to this vast multitude that the charms of butterfly farming appeal with full force. They do not care to make any money out of the business. They may not care to form a collection. They simply wish to revel in the bewildering beauties and marvelous wonders of the insect world.

The noxious and injurious insects are pretty well known to entomologists and comprise only a small portion of the species of the butterfly world. The vast majority of species will never become pests nor be a menace to vegetation and these species may be propagated with safety. The intelligent nature lover who raises moths and butterflies will not breed injurious insects and will add nothing to the labors of the eminent men who are trying to control the ravages of the gypsy moth, the tent caterpillar or the other enemies of mankind.

CATCHING BEETLES.

By Robert James Sims of Jefferson, Ohio.

"Always have a cyanide bottle with you, like a watch or handkerchief. Prof. Chas. Dury, of Cincinnati, was collecting a few of a "blister beetle," (Meloidæ) one day on his way to a funeral. He has never found any more of this species since. The fact is, beetles, as a group, are very adaptable. Different ones are to be found in all conceivable sorts of environments. But it may be said that most species of one family or tribe, anyway, will be found in one general type of place. For instance, the Tiger-beetles (Cicindelidæ, a small family), are mostly lovers of hot sunshine. They nearly all run and fly rapidly about bare, dry patches of ground. Each species has tastes of his own; one may like best a dry, sandy road up a hillside; another lives on the level sand-beaches of a lake; another on a sand-bar in a river; others the bare clay banks of creeks, old gravel pits, paths in pastures, etc. They all have to be caught with the net. Carabidæ (or ground-beetles, a large family), are nocturnal, and you must look for them under things mostly. Comparatively few are strictly diurnal. Look under old boards, rotten logs, stones, moss and dead leaves, rubbish along shores of streams, lakes, ponds, etc. A few species come out towards evening to feed on the pollen of some plants (Compositæ especially). Under the loosening bark of logs, both moist and dry, is the best place in the world to get beetles. Nearly every species of beetle, you know, is commonest at some particular time."

TIME REQUIRED IN BUTTERFLY FARMING.

"Is the work exacting?" "Does it necessarily require much time?" are frequent questions. It all depends upon what you wish to accomplish. Nature lovers will desire to obtain eggs and feed larvæ of a few species and this takes little time. If you breed all the rare species of your region, it will take time to feed the females and larvæ. My mother, Leonora G. McGlashan, has constantly assisted me in this work and we are both kept busy during the summer. There is little to do in the winter. My mother cares for the farm while I am at college.

CORRESPONDENCE COURSE IN ENTOMOLOGY.

Conducted under the auspices of the Agassiz Association.

Lesson I.

THE OUTFIT.

Beginners must have a net, forceps, cyanide bottle and entomological pins.

PRICE LISTS OF SUPPLIES.

Write for free price lists of entomological supplies to Ward's Natural Science Establishment, Nos. 84-102 College Ave., Rochester, N. Y.; The Kny-Scheerer Co., Nos. 404-410 27th St., New York City; Bausch & Lomb Optical Co., No. 154 Sutter St., San Francisco, California; Denton Brothers, Denton Road, Wellesley, Mass. The catalogues and price lists which you receive will give you a liberal education as to what may be included in an outfit. There is scarcely any limit to the expense one may indulge in, but the beginner is urged to buy as little as possible at the outset.

THE NET.

A loop of No. 9 wire attached to a bamboo rod four or five feet long answers every purpose. The wire need not be No. 9, nor the handle bamboo, nor is the length particular. Use such material as you can obtain. The diameter of the loop should be about twelve inches. The net should be about eighteen or twenty inches long and the bottom of the net should be curved like the letter U. Nets sold by the supply houses for one dollar and upwards will allow each one to suit his taste and purse, if one desires to purchase, but while I have samples of nearly all their nets, my favorite one was made at home.

The only difficulty consists in attaching the ends of the wires to the handle. One method is by sharpening the ends and driving them into the handle, another by having a tin-smith fit a tin or brass socket over the end of the handle and solder the wires firmly into the socket. The net which I have called my favorite has a hard wood handle made from a whip-stock. The ends of the light steel wire, which was used as a barrel-hoop originally, are driven tightly in a hole bored in the end of the handle, and the loop is held firmly in place by strips of electrician's tape neatly attached to the wire and handle.

The net itself can be made of any gauzy material such as bobinet, silk veiling, bolting cloth or Bruxelles. Swiss or mosquito bar will answer, but the starch must be first washed out, and they are rather easily torn.

The folding or collapsible nets with jointed handles which the supply houses advertise are especially desirable in traveling, for they may be carried in a suit case.

If you make your own net it is well to reinforce the part which passes over the wire with a binding of strong muslin, say an inch in width, which should be firmly stitched to the netting. You may let the muslin form the loop around the wire if you prefer.

Regarding the length of the handle, it may be as long or a trifle longer than an ordinary walking stick, or it may be six feet long. The longer the handle the more practice is required to use it properly, but in experienced hands it has a wider, more desirable sweep. A net should be light, strong and serviceable.

USE OF NET.

You need scarcely be told that the net can be placed over the butterfly while it is sitting on flowers or bushes, or that you can secure them while they are flying. If you place the net over the butterfly it is best to take hold of the end of the net with the finger and thumb and lift it upward, for the butterfly generally tries to fly upward. If you do not do this it may creep or fly out below your net. When you sweep the net through the air and catch a butterfly give the net a quick turn so that the upper end, which encloses the butterfly, will land over the rim. The bag of the net should be long enough to pass over the ring and protrude about six inches beyond the outer rim. In nearly every case the butterfly will be imprisoned in the end of the net.

KILLING THE BUTTERFLY.

There are at least three ways in common vogue for killing butterflies; pressing the thorax under the wings between the thumb and finger; pouring a few drops of gasoline or chloroform over the head, thorax and body; and lastly, the cyanide bottle.

Many collectors, especially when they catch a large butterfly or moth draw the folds of the net tightly over their knee, taking care that the wings are folded over the back, and grasp the thorax of the insect through the sides of the net between the thumb and finger, and kill it with a firm, sustained pressure for a moment or two. It may be killed by this process, or stunned and placed in the cyanide bottle or collecting box. If the pressure is continued long enough it will be killed and may be at once dropped into a paper envelope. One advantage of this method is that it prevents fluttering and possible damage to the plumage. A butterfly or moth when at rest may frequently be taken without a net by dextrously catching its body at the thorax, just under the wings, between the thumb and finger and killing it by pressure.

This process will not answer for small specimens unless extreme care is used, for the pressure will injure the plumage. When the bodies are very small it requires expert fingers not to touch the wings and grind their surfaces together.

Many collectors discard the poison bottle entirely and substitute in lieu thereof a small bottle of gasoline or chloroform. The liquid is put directly on the insect; head, thorax, body and wings. It causes instant death if the fumes are not allowed to evaporate too quickly, and this is prevented by putting the insect at once in papers, being careful, of course, that the wings are properly folded over the back. In using this method it is well to stretch the net gently over the knee at a time when the wings are over the back, pouring the liquid through the meshes of the net, and remove the dead insect to the paper with a pair of forceps.

While it is at times desirable to use one or the other of these methods, I am inclined to hold to the advantages of the cyanide bottle. In sugaring for moths at night where you take one hundred specimens in half an hour, I consider the poison bottle indispensable.

CYANIDE BOTTLE.

Cyanide bottles may be made by taking wide-mouthed bottles with glass stoppers, or pint fruit jars with tin covers, putting in the bottom of each a quarter of an inch of cyanide of potassium, and pouring over it plaster of paris and water, mixed to the consistency of cream, to a depth of half or three-

quarters of an inch. Cyanide is a deadly poison and if you have any trouble procuring it you can get your druggist to make the poison bottles. You can buy them already made at the supply houses. Some collectors prefer cyanide bottles made by covering the cyanide with water and pouring into the water all the plaster of Paris the water will moisten. Set the bottle in a cool place for an hour before shaking out the loose plaster and inserting the stopper. Others cover the cyanide with a layer of sawdust, cover the sawdust with a little cotton, and cover the cotton with a circular piece of blotting paper.

In taking the butterfly from the net insert the uncorked bottle into the net and place the mouth over the insect. If it does not drop or fly into the bottle but continues to cling to the netting, tap your finger slightly against the net and it will loosen its hold.

Cyanide of potassium fumes act as a powerful anaesthetic and soon render the insect unconscious, but it will revive if released from the bottle within ten or fifteen minutes. Sort over your catch every few minutes and remove the imperfect specimens. Liberate the males and place the imperfect females in paper bags or boxes in order to secure their eggs. If killed by squeezing, chloroform or gasoline this part of the work is impossible, and this is the most important part in butterfly farming.

Notwithstanding its poisonous nature the fumes of the cyanide bottle are not injurious to the collector. The bottles should remain corked except during the instant they are being used and there is no occasion to inhale the fumes. When the cyanide seems to be too weak put a few drops of water into the bottle. In the course of time the poison will so lose its strength that the cyanide must be replenished. I generally dig out the contents of the bottle and fill it anew, but when properly prepared a bottle should last for a year.

Many collectors do not use plaster of Paris at all. Some fasten lumps of cyanide in a hole made in the bottom of the cork, and others hold it in place by means of blotting-paper or cardboard in the bottom of the bottle. By these means the poison can be replenished at will, but I prefer the method stated above.

FORCEPS.

Butterflies and moths must not be touched with the fingers except in pinning, and then only the under sides of their bodies. After they have been pinned they are handled by grasping the head of the pin. At all times prior to pinning they must be handled with the forceps by grasping the fore part of the wing, close to the body, firmly but gently with the points. You can make your own forceps with a properly shaped piece of metal, and some of the noted scientists always make their forceps. A pair of ordinary tweezers, or almost any kind of forceps will answer, but the best entomological forceps cost only fifty cents and are the proper thing. I have an assortment of straight and curved forceps obtained from the supply houses, but the broad-tipped Butterfly Tweezers sold by Denton Brothers, I consider best. They are nicked plated, with leather pocket, and safety-pin for fastening pocket to clothing, and the price is fifty cents. A good pair of forceps should be the collector's constant companion. Their uses are manifold.

ENTOMOLOGICAL PINS.

Entomological pins are long and slender and must be used instead of common pins. Various brands are upon the market, and almost any of them will do, but I prefer Klaeger Special black Japanned steel pins, numbers 1 to 4.

Within the past month the prices of all entomological pins have advanced slightly.

Some of the moths fold their wings over their backs, the same as the majority of butterflies, and these may be placed in papers. Almost all the moths, however, and the *Hesperidæ* and smaller butterflies should be pinned with entomological pins through the thorax, from the back. Great care should be taken in pinning insects to see that the point of the pin is inserted in the middle of the thorax and passes through the body at right angles to a line drawn from the head to the tail. The thorax is the second part of the body, between head and abdomen the part bearing the wings and legs. When spread, the wings should be seven-eighths of an inch from point to pin. About one-third of the pin should remain above the body of the insect. Pinning insects is nervous work until you have had some experience and I advise the beginner to practice a great deal in pinning broken and worthless specimens, after which the pins may be removed. The supply houses sell what they call an insect height adjuster, by which the height of the pin above the insect may be kept uniform and the height of locality labels may be regulated. Uniformity in these matters adds greatly to the appearance of a collection. The adjuster costs fifty cents, and while not a necessity is useful to the inexperienced.

The outfit above mentioned is an absolute necessity. It is the very scantiest outfit I can mention, and you will understand that many articles can be added with profit. With less, you cannot proceed at all.

CORK-LINED BOXES.

Provide yourself with a number of empty cigar boxes, line the bottom of these with insect cork, peat, turf, pressed cork or cork-linoleum. This last may be obtained at any carpet store and is quite cheap, especially if you buy remnants or "scraps." Cut the linoleum to fit the bottom of the box, first stripping off the cloth which lines the back of the linoleum. Stick it firmly to the bottom by means of glue or flour paste. Pin your moths and the smaller butterflies firmly into these boxes, side by side, but not allowing them to touch each other. Blake's Pinning Forceps costing \$1.50 are almost a necessity in pressing the pin firmly into the linoleum. To do this, grasp the pin below the insect with the jaws of the forceps and press it so firmly down that it cannot jar loose.

SHIPPING INSECTS.

In shipping specimens you need not spread them. Send butterflies in papers, moths pinned in boxes lined with cork or cork linoleum. These boxes should be packed in a larger box with excelsior, cotton, wool, moss, hay or straw, or some substance that will prevent jarring. Nine-tenths of the material I have received during the past year from those who were my pupils during the free correspondence course, was more or less damaged because of improper packing. Many valuable consignments were crushed and ruined by contact with heavy packages in the parcel post. Too great care cannot be exercised in packing entomological specimens. I nearly always ship through the express companies. It costs but little more and the service is worth the expense. Express companies have "fragile" labels which generally insure proper treatment. If your agent does not keep these apply to me.

WHAT ARE PERFECT SPECIMENS.

Absolutely perfect specimens, and none other, are salable. The loss of an antenna, leg, or the slightest damage to the wings or to the scales which

cover them renders the specimen worthless. I cannot impress this point too strongly. Mercilessly reject every worn, battered, or imperfect specimen from your catch. Even the specimens which you send for identification should be perfect. When I, or any one else, name your specimens the only payment we ask is that we retain them. Of course, if you have but one imperfect specimen of a given species, send it along and it will be named if possible. If you have rare species, and only one of a kind, they will be returned upon request. As a rule, however, you number each specimen sent and retain a duplicate specimen which bears the same number. Do not send male and female under one number, but assign to each insect a different number.

MARKETING SPECIMENS.

Many correspondents ask me as their very first question, for a list of those who will purchase their lepidoptera. It may be the writer never caught a single specimen properly, never owned a net or cyanide bottle, never saw the egg of a moth or butterfly, nor an entomological pin, and does not know the most elementary principle of entomology, but wants the name of some one to whom he can sell his butterflies and wants to know what will be paid. These questions cannot be answered by myself or anyone else, until it is known what insects fly in your locality, and what you can offer in presentable shape. The first reply of a dealer to whom you write is: "Send me your lists." You must first learn to take or breed perfect specimens and when some one has named them, prepare lists of what you can offer. Some dealers want one thing and some another. Sometimes one can sell at a flat rate the lepidoptera of a particular locality, but the purchaser must know something of the collector's ability and honesty, and must know much of the species found in that locality, before closing such a contract.

THE SELLING PRICE OF LEPIDOPTERA.

The average person who learns for the first time that butterflies and moths can be sold, very naturally concludes that they all have the same price. Very frequently I have received a box full of worn and worthless material, perhaps thrown in together without any attempt at papering or pinning, and the accompanying letter asks me to send the money for the flies. You can imagine the predicament in which I am placed.

Ward's Natural Science Establishment, 84-102 College Ave., Rochester, N. Y., issue a price list of Lepidoptera, for which they charge 25 cents, deducting this, however, from the first order which you send them for supplies. It gives the price which they ask for almost every species of butterfly and moth in North, Central and South America. It is very valuable to the beginner for it at least shows the price which is charged for each specimen. Those who wish to sell Lepidoptera can usually receive offers from this company providing they know the names of the specimens which they can offer for sale in perfect condition.

As a matter of fact, each collector places a price upon the material he has to offer to purchasers, and these prices differ greatly, and so affect the market. This renders it difficult to fix a definite value upon a given specimen.

LISTS OF LIPIDOPTERA.

I have on hand the entire output of my farm, and all that I have collected this year, amounting to about 20,000 perfect specimens. During the long Truckee winter this material will be sorted, named, listed and offered to dealers. Those who purchase in large quantities the butterflies which are in

papers and the moths which are pinned, will receive an exceedingly low price. Those who wish specimens spread, with labels showing name, locality and date, will pay a somewhat higher figure. Those who wish only particular species which are rare will be asked a much higher price. I mention these things because I know of no other way to handle such an amount of material. It is my intention to advertise sets of the Lepidoptera of the Sierra Nevada Mountains. Species which cannot be obtained at Truckee will be purchased from correspondents.

Herman H. Brehme, 74 13th Ave., Newark, N. J., issues for purposes of exchange just such a price list as I have mentioned. It is quite common to see similar lists advertised in the Canadian Entomologist, Guelph, Ontario, Canada, and in the Entomological News, Academy of Natural Sciences, Philadelphia, Pa. Dealers frequently advertise their wants in these journals.

ONE CASH PURCHASER.

Dr. William Barnes, 152 East Prairie St., Decatur, Ill., is perhaps the largest purchaser for cash in America. Last year he bought my entire output, 11,500 specimens, unnamed and unsorted, for five cents per specimen, promptly sending me his check for \$575.00. I would much rather sell the results of a season's work, in bulk, at this low figure, than to sort, label, spread, and name each insect and dole them out to individual purchasers at a much higher rate. There is a world of work in properly preparing 20,000 specimens for market.

EUROPEAN DEALERS.

Dealers in Canada, England, Germany, Austria, Russia, and in fact in all foreign countries, as well as those in the United States have their own particular, individual methods of purchasing flies. In Europe, the prices paid for each species has been pretty well regulated and determined, but in America collectors have been in the habit of accepting whatever they could get for their specimens. Each one competes with the other and the result is that there are no such thing as fixed values. It is only by communicating with a large number of dealers that the best selling prices can be ascertained.

Certain specimens bring far more than others, and it is the breeding and rearing of these specimens which justify butterfly farming. When you have learned to know the rare species which fly in your particular locality you will devote your attention to the propagation of these species. Should you discover a species which is new to science, you could profitably dispose of hundreds and perhaps thousands of specimens of this single species.

Of course, I am only speaking of the markets offered by those who buy and sell Lepidoptera in order to supply the wants of the cabinets of museums and collections. It is said there are ten thousand purchasers in the world who will pay cash for their desiderata. Collections are being started every day in various parts of the world.

INTEREST IN AMERICAN MOTHS.

A new and active interest has been taken in American moths during the last few years and the demand is surprisingly large. This is the reason why each correspondent should learn how to successfully sugar, collect from flowers and lights, trap, and propagate moths. It is possible that new species may be found in each locality. Truckee alone has produced over a score of new species of moths, and many localities could do as well if properly worked.

SELL TO RESPONSIBLE DEALERS.

The greatest trouble you have will not be to find a sale for your specimens, but to get your money after you have sold them. I am sorry to say that a vast number of purchasers will accept your shipments and never pay you a cent. I know of only one way to avoid this difficulty and that is to deal with responsible and honorable dealers, or else demand cash in advance, or make your shipments C. O. D. by express, allowing privilege of examination.

Dr. Barnes has given me full permission to refer to him when writing to dealers, and as a slight return for his kindness I wish to state that he will promptly pay for everything which he agrees to purchase. He is a millionaire and has the finest private collection in America, therefore he is not in the market for common species. It is quite likely, however, that in each locality there may be rare butterflies and moths which he would be pleased to obtain.

I shall give the names of those who purchase lepidoptera and coleoptera in future lessons of this course, without making any charge therefor, and am anxious that purchasers should write me their desiderata. I want each subscriber to learn to market his own material, but if each will send me a list of what he has to sell I may frequently be able to obtain better prices for him than he can himself, even though I deduct a fifty per cent commission.

WANTED: CATOCALA EGGS.

Dr. Barnes is at present in the market for all kinds of Catocala eggs, takes 100 eggs of each species and pays at the rate of \$1.00 per hundred. Catocalas come readily to sugar and lay their eggs in paper bags. All you have to do to secure eggs is to place the female in the ordinary paper bag used by grocers, and to feed her with a piece of dried apple soaked in water to which has been added a little honey. Evaporated apples will answer and most any kind of fruit may be substituted if it is liberally sprinkled with sugar. Catocalas will sometimes lay as many as a thousand eggs each. Before shipping eggs to Mr. Barnes you will of course correspond with him and make your own contract. I think that I can sell twelve hundred eggs of each Pacific Coast species at one cent apiece or one dollar per hundred. The species must be named and the eggs must be fertile. In shipping Catocala eggs send the paper bag containing them and the mother moth.

SETS OF LEPIDOPTERA.

I have orders for sets of all moths and butterflies of the Pacific Coast, and when I receive your lists I can write each one of you the price offered for each species. I also have orders for nearly all species of butterflies and moths in America, and so want the lists of every correspondent. Send me samples of your moths and butterflies and I will name them and give you estimates of prices. The time has arrived when those who wish to form private collections can obtain specimens at reasonable prices. If all who have specimens for sale will correspond with me it will be practical, in the near future, to offer sets of nearly all American butterflies and moths at so low a figure that almost any person of moderate means may purchase such a set.

Now is the time to place orders for hibernating eggs, larvæ and pupæ. I will purchase in lots of one thousand the cocoons of all the large, handsome moths, and of many of the more brilliant species of medium size. These I will retail out during the coming winter, at a slight advance on the purchase price, to all correspondents who wish to buy. In this manner, for a nominal sum, every person may experience the delight of seeing these wonderfully beautiful creatures emerge from the pupæ.

MAKE CONTRACT BEFORE SHIPPING.

Never ship to me or any one else a lot of adults, pupæ or eggs, for the purpose of having them sold, until you have first sent samples and have a plain, square contract. If you disregard this admonition your material may be returned at your own expense.

SCOPE OF FIRST LESSON.

This first lesson is but a scanty outline of the subjects treated. Each subject will be amplified in future lessons. Each collector has his own particular views as to what an outfit should contain. They differ greatly and the ideas of each one may contain merit. When an author tells you to do a certain thing in a particular way that does not mean that there are not other ways which may be better. I shall always state my own way and give my own views, but in the very next lesson I may tell you of a better way, or present sounder views from some Entomologist.

INFORMATION REQUESTED.

I wish each subscriber would write me as to whether or not he knows how to spread butterflies and moths; whether he has bred lepidoptera from egg or larva; has started a private collection and wishes to exchange; whether he has lists of the species of his locality and desires to sell specimens. I want to be acquainted with the status of each subscriber so that I may teach each one individually by letter if necessary, and at all events be able to render the greatest benefit to each. I do not expect so many subscribers that I cannot give each the individual attention his necessities require.

BOOKS.

If you merely wish to collect and breed lepidoptera for sale I expect this course to give you full instruction, but in order that you may understand how to identify your own species and such as you receive by exchange or otherwise, you should possess "The Butterfly Book" and "The Moth Book," by W. J. Holland. The first costs \$3.00, the second \$4.00. They give colored plates of nearly all important species of lepidoptera. Doubleday Page & Co., of New York, are the publishers, but the books can be obtained through any dealer. If you have access to libraries familiarize yourself with all the Entomological works which they contain. If you can learn from these lessons the essential principles of Butterfly Farming, a subject which you will not find in the books, that is no reason why you should not be benefited by a good supplemental course of reading in Entomology.

THE TWO MISTAKES OF BEGINNERS.

The two greatest mistakes of beginners are:

First—At the outset they jump at the conclusion that entomology is far too difficult a subject for them to undertake.

Second—When they have received just a little knowledge they become convinced that they know it all and require no further instruction.

Address all letters:

(MISS) XIMENA McGLASHAN,

Truckee, California.

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THE BUTTERFLY FARMER

A MONTHLY MAGAZINE FOR
AMATEUR ENTOMOLOGISTS



XIMENA McGLASHAN

Publisher and Proprietor

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Business Manager

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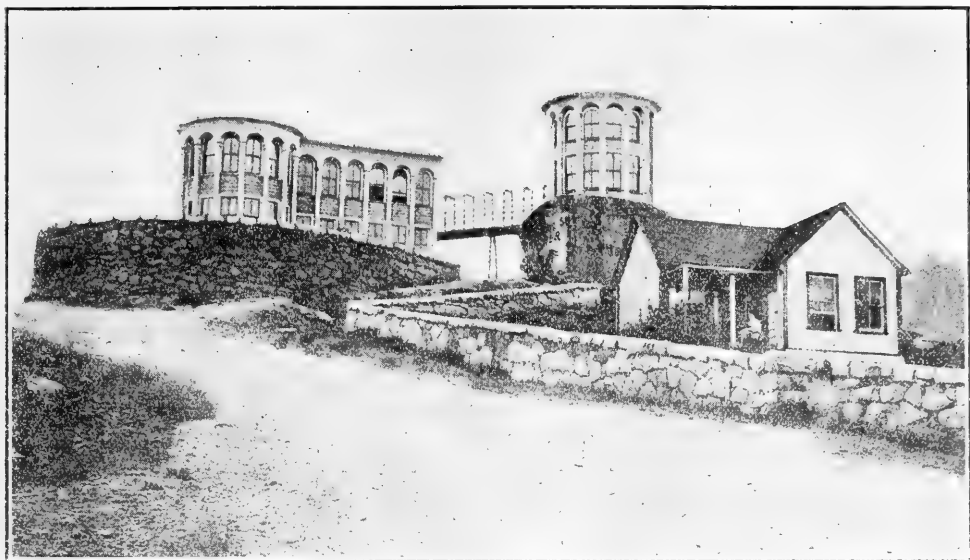
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McGlashan Home and Rocking Stone Tower, Truckee, Cal.

THE BUTTERFLY FARM.

My "farm" is not so much as a garden. It consists of the home of my parents, the door yards, the cottage under the hill, and the surrounding mountain sides, with the lakes, forests and massive crags of the summits of the Sierra Nevada. It is a big, glorious farm with an elevation of from 6,000 to 10,000 feet, contains quail and grouse, deer and bear, and the finest trout streams and lakes in the world. Thousands of tourists help me enjoy it in summer, and in winter its ice-carnivals, ski-races, toboggan slides, skating, coasting and sleigh-riding attract other thousands of visitors. Of course I do not own one foot of it, but I hunt butterflies by day, sugar for moths at night, and gather foodplants for my larvæ, exactly as if I were the sole proprietor of river, trout brooks, lakes, valleys, dense dark forests of conifers, and towering cliffs. My parents allow me to rear lepidoptera in every part of the house from basement to tower. The "Rocking Stone" weighs 16 tons, is inside the tower and rests upon the large boulder which supports the building. It is poised so delicately that a child can move it and is probably the handiwork of some long forgotten race of people. Inside the tower is a large collection of butterflies and thousands of curios including the relics of the cabins of the ill-fated Donner Party.

YOUR INSTRUCTORS ARE SCIENTISTS.

It must seem absurd to old entomologists that "a slip of a girl," as Gladwin of the Hearst papers calls me, should attempt to publish a magazine. It must seem more absurd that having only studied the science fifteen months she should advertise a complete correspondence course in entomology. If this were the entire story it would be absurd.

Almost at the outset I discovered that any one who attempts to break into the charmed circle of the entomologists will find few guides. All the books are printed for scientists, not beginners. The novice must grope his way as best he can. The learned men who might help him are deeply absorbed in biological problems which engross their time to the exclusion of almost everything else. The very best that the beginner can hope to do is to fall into the clutches of some collector who will teach him just enough about collecting to get his specimens. If he tries to sell there is no one to assist him in finding honorable purchasers and he meets with obstacles and disappointments.

Scientists are generous to a fault. They are the happiest class of people on earth and care the least for money or material things. They would gladly help the worthy beginner but they really cannot afford to waste their time in finding out who are worthy. The great mass of "beginners" are simply curiosity seekers who do not possess the vim and endurance to succeed in any business, however easy it may be.

I was enabled to earn money the first day I began to collect, for my father turned over to me an offer which Dr. William Barnes had made to him. In two weeks I had made \$75.00 and had learned that by propagating lepidoptera I could increase my income. Before I had worked a month I was receiving \$50 a week. Then the unexpected happened. Mr. L. A. P. Eichler, of the Sacramento Bee, visited Truckee, learned of my novel avocation and published the fact that women could earn a livelihood by collecting and propagating lepidoptera. The story spread all over America and was translated and published in almost every foreign language.

There are eight children in our family and our parents teach us that next to the duty of earning a living is the duty to help others. I taught all I knew to all enquirers. This fact was published broadcast by the newspapers and magazines. Again the unexpected occurred. Entomologists who learned that I was giving free instruction to girls, women and men who wished to learn the business, began to write encouraging letters and offered to aid me in dozens of ways. They gave and loaned me rare books and records which money could not purchase. They copied their private "records" for my benefit. They wrote long letters, giving me valuable instruction on all branches of the work. I was enabled to teach my pupils by circulars not only the things I knew, but the things which the wisest scientists know.

When it became apparent that no modern list of foodplants had been published and I was compelled to undertake the task, some of the most noted scientists of the nation were my assistants. The foodplant charts are imperfect but afforded a basis for intelligent work, and the moment they were issued I began to receive corrections and additions from all who have bred insects. During the coming year I can publish revised lists of foodplants and the revisions will be the product of the observations of savants who are eager to assist beginners.

When the products of my farm assured an income which enabled me to re-enter college and study entomology, biology and botany to fit me for future work, the problem arose as to what I should do for my pupils. A comprehensive correspondence course, at a nominal cost to cover expenses, seemed the only solution. Before undertaking such a course I sent circular 9 to all scientists

asking for their aid. The responses were prompt and generous. All are ready to assist beginners.

And so, it is not a girl nor a beginner who is offering to teach enquirers, but a host of learned and influential scientists. Those who have not promised aid are earnestly requested to help. We want a complete course of instruction, one which is far and away better than has ever been published, and we are founding our trust upon the assistance of entomologists.

HOW TO DISCOVER FOODPLANTS.

Subscribers should possess the foodplant charts. They may be had for the asking. You will be surprised to see the names of many species followed by an interrogation point which indicates that their foodplant is unknown. In many instances it is not exactly unknown, but if the larvæ of the particular species have been reared on the plant the fact has never been published. For instance, look at the large family of *Argynnis* and *Brenthis*. Sixty species are named and the foodplant of only twelve are mentioned. In every instance where it has been tried the foodplant is violets. Doubtless the other forty-eight species feed upon violets, but if the matter has been successfully tested it has not been given publicity. Females of this family will lay their eggs in paper bags without requiring the presence of the foodplants. How easy it would be for even a beginner to catch an *Argynnis* or *Brenthis* female, put her in a bag, feed her upon apple soaked in honied water, secure her eggs, and when the larvæ hatch feed them upon violets, report the fact and add an atom to science.

The fact that so many species have never been reared is that it requires a little work to feed the larvæ. The vast army of scientists who devote their attention to economic entomology breed only pests, or parasites to destroy larvæ, Harry S. Smith, of the California State Insectary, writes:

"You ask how we discover the foodplants of the butterflies which are bred at the Insectary. We really discover the foodplant first and the butterfly afterwards. We work only with insects which are injurious to cultivated crops, and whenever an insect of the order lepidoptera is found destroying one of these crops we bring it into the Insectary for study, but we have never collected the moths and butterflies which are not of economic importance."

It will devolve upon the nature lovers and amateurs, upon the butterfly farmers, to discover and publish the foodplants of all butterflies. In many cases it will be simple. All you have to do, even where the butterfly requires the foodplant before she oviposits, is to confine her in a cage, paper bag, or gauze covered box containing the foodplant upon which other members of the family feed. A little study will enable you to guess the plant she requires. Two or more plants of different species may be placed in the cage, and she will choose her favorite. You will enjoy rearing the potted plants, enjoy watching the mother fly lay her eggs, and when you have reared the larvæ to maturity you will have the honor of adding a new foodplant to the list, and will have bred a number of perfect specimens which you can sell. You will doubtless make failures but you will score victories.

Do not confine your efforts to one species. Try to get eggs from as many species as possible. One success will compensate you for all your trouble. Until you have had a little experience it will be well to experiment with varieties whose foodplants are known, instead of trying to get eggs from varieties which have never been bred. Many correspondents write that they have tried in vain to get the eggs of a particular butterfly, and upon inquiry it is ascertained that they have not tried the proper foodplant.

Science terrorizes ignorant minds. One who never studied botany is horrified at the Latin name of a plant. "Trifolium" causes a panic; yet any dictionary will tell you that it simply means clover. In future foodplant charts great pains will be taken to give common names of plants wherever possible, but there will always be a large proportion of Latin names for common names are very unreliable. A very useful book is "Plant Names, Scientific and Popular," by A. B. Lyons; Nelson, Baker & Co., Publishers, Detroit, Mich. It costs \$2.50 but is invaluable. You ought to have some work on botany. Second-hand book stores are good places to secure botanical and entomological works. You do not have to study botany to be able to learn nearly everything you require, especially if you know how to consult an index. Many correspondents get all their botany from a dictionary. The Century or any complete dictionary gives all needed information.

NAMES OF PURCHASERS.

Following are the names and addresses of parties who have written me that they wish to purchase eggs, pupæ and perfect specimens and who offer to pay cash for their desiderata. They desire price-lists, and I urge all correspondents to notify each what they can furnish. You are directed to make your own contracts and to satisfy yourself of the reliability of the party with whom you deal. All subscribers who are purchasers, and all who have specimens for sale or exchange, may advertise in this column without charge. It will be readily understood that this department is intended to introduce you to purchasers, and you will deal with them on your own terms and at your own risk:

- E. Herfurth, Postsecretoir, Weimar, Germany:
 Walter Pierson Blackwood, Jr., 3621 Virginia Ave., Kansas City, Mo.
 Wm. H. Broadwell, 571 Hawthorne Ave., Newark, N. J. (Goemetridæ).
 C. Emerson Brown, Chief Taxidermist of Boston Society of Natural History, 44 Sudbury St., Boston, Mass. (Bright colored specimens).
 E. F. Eisinger, 1071 Franklin Ave., Bronx, N. Y.
 Otto Ekdahl, Halmstad College, Halmstad, Sweden.
 Dr. Giorgio Finzi, Gazzada, Varese, Italy.
 Wilhelm Hamann, Elster St., 6111 Neukolln, Germany.
 Laurence L. Huntley, 24 Jewett St., Providence, R. I.
 E. W. Kelly, Box 335, Seneca, Ill.
 C. E. Moore, 714½ N. Sixth St., Kansas City, Kans.
 Fred Morleff, Box 104, Oak Station P. O., Alleghany Co., Pa.
 William Reiff, Care of Entomological Exchange, 366 Arborway, Jamaica Plain, Mass.
 M. Rothke, 1957 Myrtle St., Scranton, Pa.
 Hugo Schaaf, Wald Vis Salinger, Portrasse, Germany.
 Philip Stark, Care of Messrs. Sutro Bros. & Co., 44 Pine St., New York City, N. Y.
 Wm. Stein, 144 W. 123rd St., New York, N. Y.
 Edward Tachell, 23 The Arcade, Bournemouth, England.
 Walter Tonelle, 48 East 68th St., New York, N. Y. (Saturnidæ and SpHINGIDÆ).
 Dr. Robert Unzicker, 919 Greenwood Terrace, Chicago, Ill.

WANTED—Transactions of the California Academy of Sciences, 1901, No. VIII. Any one having that volume for sale will please communicate with Rensselaer J. Smith, M. D., Milpitas, Santa Clara County, California.

THE PAPAPEMA.

By Henry Bird, Rye, N. Y.

I can well understand your success with the butterflies—no one can blame them. Your familiarity with larval habits and foodplants prompts me to ask your help in securing the larvæ or pupæ of a certain moth which you ought to encounter. I am making a special study of the noctuid genus *Papaipema*, and need more of Californian species. I have tried to have professional collectors get the larvæ for me, the original discoverer in one case having moved away, but to no avail. The larvæ bore in the stems of a large woolly thistle, *Cirsium occidentale*, and seem plentiful about San Francisco. They hatch out about June 1, become full fed around August 1, and remain in pupæ about a month before giving up their moths. A section of the plant containing the specimen would reach me in condition if mailed in a tin box. I enclose a note on one of those working in *Cirsium*, known as *P. erubescens*. Possibly this same species works in *Heracleum lanatum* or other thick stemmed plants. Another species that I desire even more than this one, bores the leguminous plant *Psoralea macrostarcha*, one of the Pulse family. This species has been taken at Anaheim, also at Los Angeles. Another ally works in the stem and root of the yellow Lupine, *Lupinus arborens*. Others still have been seen in "Tiger lily and various large Umbellate plants." Won't you please bear these matters in mind next June and July and see if you cannot score a point on the professors, through the discovery of these larvæ? If you encounter any of these please write me. They may be known by a peculiar dark girdle on the first four abdominal segments, the other segments being relieved by white stripes. If you gain a familiarity with these boring larvæ you will be almost sure to encounter unknown species.

The following is submitted for your revised foodplant lists:

	Papaipema Species.	Foodplant.	Authority for Foodplant.
1	appassionata Harvey	Sarracenia	Jones, Bird, et al.
2	cerina Grote	?	
3	inquaesita Grote & Rob.	Onoclea	Bird
4	speciosissima Grote & R.	?	
5	stenocelis Dyar	Woodwardia	"
6	nephrasyntheta Dyar	?	
7	marginidens Guenee	Cicuta, Sium	"
8	baptisiae Bird	Baptisia	"
9	moeseri Bird	Chelone	Winn, Bird
10	furcata Smith	Fraxinus	Doll, Washburn
11	circumlucens Smith	Humulus	Bird
12	rutila Guenee	?	
13	ochropenta Dyar	?	
14	merriccata Bird	Podophyllum	Bird
15	insulidens Bird	?	
16	angelica Smith	Psoralea	Coquillett
17	astuta Bird	Collinsonia	Bird
18	activorens Hampson	Arctium, Carduus	Brainerd, Bird
18½	erubescens Bird	Cirsium	Bird
19	harrisii Grote	Heracleum	Thaxter, Bird
20	impecuniosa Grote	Aster	Bird

	Papaipema Species.	Foodplant	Authority for Foodplant.
21	verona Smith	Eupatorium	Criddle
22	limata Bird	?	
23	latia Strecker	(Xanthoecia buffalensis Grote), food-plant unknown	
24	purpurifascia Grote & R.	Aquilegia	Bird et al.
25	anargyria Dyar	?	
26	pterisii Bird	Pteris	Bird
27	rigida Grote	Heliopsis	"
28	duovata Bird	Solidago sempervirens	"
29	cataphracta Grote	General feeder in large herbaceous perennials, Eupatorium, Arctium, etc.	Bird et al.
30	imperspicua Bird	?	
31	unimoda Smith	?	
32	errans Barnes & McD.	?	
33	aveme Lyman	?	
34	nelita Strecker	Rhudebeckia	Bird
35	frigida Smith	Thalictrum	Lyman, Bird
36	cerussata Grote	Vernonia	Bird
37	sciata Bird	Veronica	"
38	limpida Guenee	?	
39	nebris Guenee	Ambrosia	Bird et al.
40	duplicata Bird	Collinsonia	Bird
41	maritima Bird	Helianthus	"
42	eupatorii Lyman	Eupatorium	Lyman, Bird
43	necopina Grote	Helianthus	Bird

The genus is North American: one species, not here mentioned, comes from Mexico. In a general way the localities are as follows: No. 1 follows the food-plant from Southern Canada to the Gulf; 5, 6, New Jersey, Maryland, southward probably; 10, Middle West to New York; 12 and 38, Illinois; 13, Colorado; 15 and 22, State of Washington; 16, California; 18, Southern Canada; 18½, erubescens, comes from California; 23, New York and Pennsylvania; 25, Colorado to New York; 28 and 41, Atlantic Coast, Connecticut to Virginia; 31, Colorado; 32, New Mexico. The rest occur in suitable environments, rather generally over the Eastern United States.

ENTOMOLOGICAL INTEREST IN CANADA.

J. D. Duthie, editor of The Canadian Thresherman and Farmer, Winnipeg, Canada, writes:

"I was much interested in reading a notice of your "Butterfly Farm" in a recent issue of the London "Daily Mirror" and as a lepidopterist of long standing am writing to ask if you will kindly oblige me with a price list of what you are handling. I had a splendid collection of British insects collected by myself in Scotland and England but regret to say a large portion of them was ruined in transit when I came to Canada some seven years ago. I have a fair collection of local insects now which I have made during the last three or four

years in Western Canada and have also about a thousand specimens of exotic lepidoptera which have been sent me by friends or which I have had in exchange. I am willing to spend a good deal on this (my only hobby) and if I can help you to any of our Northern species, I would be happy to do anything I can in this way. The "Mirror" gives no details of your farm in its business aspects, but I would be glad to conform to any requirements you might stipulate. What I want are perfect specimens, not of the micro-lepidoptera, but of the larger specimens, and for this purpose would be glad to have any pupæ or perfect insects which you will no doubt have done up in envelopes for relaxing.

"Our city is establishing a natural history museum and I have undertaken to build up the butterflies and moths. Further, the schools here are going strong for this section and I am helping all I can. There are only one or two of us here who have done much or serious work.

"I am more anxious to get good pupæ than to have the perfect insects, but as the season moves on and you are able to send the latter in envelopes I will ask you to help me. I am interesting quite a few friends here and we will not take advantage of your help or advice in any way without reimbursing you to your entire satisfaction. There are no 'mean' people so far as I know in our circle and I will be responsible for anything any one may ask you to do for them should they write you, over my name. If you have to express, I will be happy to discharge cost of same on arrival here. At no time run any risk you can avoid by sending a flimsy parcel merely to reduce cost of postage or express. Your own experience will guide you with the assurance from me that I don't regard any few cents, or even a dollar or two here or there, as wasted that is used to insure the safe transit of these delicate shipments."

APANTESIS FEMALES WANTED.

Herman H. Brehme, dealer in butterflies, moths and cocoons, 74 Thirteenth Ave., Newark, N. J., says:

"I am very much interested in the *Apantesis* group and I think I have as good a series of these little creatures as any collector, that is of the eastern species. While I have some of the western species, and nearly all, the females are missing, and the reason I do not get that sex is because the females do not fly to any great extent and do not often come to light. So after reading your history in the newspapers about your "Butterfly Farm" I thought that you may be the person to help me along to get some good bred females and also males of this group. The larvæ of all *Apantesis* hibernate and there is not much move in them when they are in that state.

"While I am a dealer in lepidoptera it is only a side issue, but I get orders from the other side sometimes to the extent of a thousand dollars or more. These orders are, however, mostly for pupæ and cocoons. So there may be something come your way if you care to sell to me and are not under any obligations to the other dealers. Of course, I don't want to hurt your trade with other dealers, but I do sincerely hope that you will help me along with *Apantesis*. Enclosed you will find my list.

"I saw some of your specimens which you sent Dr. Barnes and the Doctor gave me several species which, of course, I was very glad to get. If I can be of any further assistance to you I will be pleased to help you. There is no question but that you have undertaken a great piece of work and all the assistance possible should be given you."

VISIT ENTOMOLOGISTS.

Do you know of some entomologist or collector who lives in your vicinity? If so, by all means call upon him. He will be glad to teach you how to spread and mount insects, will show you his tools, implements, apparatus and cabinets, and will give you scores of valuable suggestions and pointers regarding the business. You will learn more by seeing a thing done than by reading pages of written instructions as to how to do it. Do not be afraid to approach any entomologist. If you are enthusiastic, energetic, eager to learn, he will gladly give you a helping hand.

THE NATURALIST'S DIRECTORY.

A new edition of "The Naturalist's Directory" is now being compiled by Mr. S. E. Cassino, Salem, Massachusetts, and will be published this fall. This valuable work has been published every few years since 1880 and comprises the names and addresses of all English speaking naturalists, as well as full particulars of the subjects in which each is interested. You should have your name and address in this book, and whether you desire to exchange or sell Lepidoptera. It will give you the names of dealers and be of great value in the way of securing purchasers.

FOODPLANT PAMPHLETS.

Prof. John Barlow, Department of Zoology, Rhode Island State College, Kingston, R. I., says:

"I have received your chart of the foodplants of the butterflies and am surprised that there are so many gaps in the list. Not being a student of the lepidoptera in particular I was under the impression that the foodplants of most of the butterflies was known. But this shows that one may study the insects all his life and only scratch the surface of the vast subject. You are doing a valuable work, as the greatest need of entomology at this time is comprehensive synopses of special fields such as the one you are working in. If you will permit a suggestion, it seems to me that a pamphlet rather than a bulky chart would be more convenient for most of us to use. Please accept my thanks for your useful and interesting contribution."

COMPLIMENTARY.

Virginia Barnum, 308 West 8th St., Grand Island, Neb., writes: "I am enclosing check for \$5.00 payment in advance for The Butterfly Farmer. I am anxious to get started. Mrs. Gene Stratton Porter writes me in regard to you: 'She is a "plumb" good one; a little hustler on a Scientific basis.' For this reason I have no further hesitation in taking your Course."

CORRESPONDENCE COURSE IN ENTOMOLOGY

Conducted Under the Auspices of the Agassiz Association.

Lesson II. The Egg.

A NEW INDUSTRY.

To propagate the moths and butterflies of a given locality for market, appears to be a new industry. Scientists have obtained eggs in order to describe them and carefully note the larval and pupal transformations, and many collectors and entomologists have bred a few species from egg and larva. It seems a novel proposition, however, to propagate lepidoptera on a wholesale scale, and to trust to breeding, rather than to the arts of the collector, for your output.

DEMONSTRATING THE VALUE OF FARMING.

On the summits of the Sierra Nevada Mountains, at an elevation of 6000 feet, in the little town of Truckee, California, I last year demonstrated that an eighteen-year-old girl could earn fifty dollars per week collecting and breeding lepidoptera. This was done without a dollar of capital, with no previous study or knowledge of entomology, without serving any apprenticeship, and with little or no expense. My father was my teacher and constant adviser, and I saved almost every unsalable female moth and butterfly and endeavored to secure her eggs.

BOOKS SILENT REGARDING INDUSTRY.

I have searched rare and costly entomological works in a vain endeavor to find directions regarding breeding from the egg for market. All authors instruct collectors to begin with the caterpillar. All the various methods of collecting with the net, by sugaring, at night, etc., and the rearing of larvæ, care of cocoons, and the preservation of insects are fully discussed in the books, but not one tells you that the easiest, most profitable, most prolific method of obtaining large quantities of lepidoptera is to secure eggs, lots of eggs, all kinds of eggs, and to obtain eggs from the resultant progeny. The great entomologists who have experimented with eggs never thought of selling specimens. They were only interested in the eggs from a scientific, biological standpoint, and that doubtless explains their silence upon the subject of the profit collectors would derive from securing as many eggs as possible. Otherwise they would surely have published the fact that the simplest method of obtaining vast numbers of caterpillars is to secure vast numbers of eggs.

REJECTED MATERIAL MOST VALUABLE.

The Collector discards and throws away as worthless, the most valuable part of his catch. Of two females of a species new to science, I prefer one that

is damaged to one which has just emerged from pupa. The latter counts one perfect specimen, the former probably contains fertile eggs and may produce hundreds of perfect specimens and her offspring may propagate thousands. Collecting does not pay, as a rule, and butterfly farming does. Collecting is hard, disappointing, and generally unprofitable work, while any woman or child may obtain eggs, rear larvæ and do every branch of farming. All of it can be done at home except the work of obtaining the females which lay the eggs. To obtain females one must thoroughly understand collecting.

THE FOUR STAGES OF BUTTERFLY LIFE.

The four stages of butterfly life are egg, larva, pupa and adult. While you are collecting butterflies and moths with the net or by other processes, you are on the constant lookout for eggs, larvæ and pupæ. Gather from shrubs, bushes and trees all that you can find in either stage. Eggs are frequently laid on leaves, and as a rule are found on the foodplant upon which the caterpillar will feed. Larvæ are always found upon the leaves of their natural foodplant, unless you happen to meet them when they are crawling on the ground in search of a favorable place to pupate.

EASY TO OBTAIN EGGS.

Nearly all the moths and about one-half of the butterflies will oviposit in paper bags and boxes if you will simply feed them once a day. They require no other care and are not the slightest trouble or worry. In sugaring for moths I buy the little pasteboard boxes used by druggists, which are approximately 3x2x1 inches, though the size may vary with the size of the moth. What are known by druggists as "No. 49 White Slide," is a favorite size and can be purchased at about \$2.00 per gross. If you are careful not to render them sticky by putting in the apple when it is too wet, you can use the boxes over and over again. For large moths and butterflies use paper bags obtained from the grocery stores at a few cents per hundred. Use different sizes, according to the size of the insect.

FEEDING THE FEMALE.

Procure from your grocer a quantity of dried apples. Evaporated apples will do, but the old-fashioned sun-dried article is preferable. Place a sufficient quantity of these in a bowl or pan and cover them with cold water. When the water is absorbed add more until they are thoroughly soaked, then add to the water a little strained honey, a tablespoonful of honey to a quart of water is sufficient. Sugar or molasses will answer but are not so good as honey, for they will ferment and you must throw the apples away, while the honied mixture can be washed off the pieces which are used, and the apples when dried can be used over and over. The fly does not eat the apple, it simply sips the honied moisture. Without this the fly would soon perish from thirst and hunger. Each day when you insert the new piece of apple remove the old one unless it be covered with eggs, in which case you must allow it to remain in the box. Feed your moths in the day time and your butterflies at night and they will not be so apt to escape when you open the box to insert the apple, for butterflies do not fly at night and night-flying moths do not fly by day. To use paper bags you simply fold or crease the two sides of the top of the bag,

once or twice. The female will be unable to escape when you open the bag to introduce the food, if you are careful. Drop apple without removing the old pieces.

TIME REQUIRED FOR EGG LAYING.

Different species lay their eggs in different periods of time. Some oviposit within a few days, others require weeks. Some will begin laying within twenty-four hours after being placed in confinement, others will not begin laying for a considerable number of days. The principal objects of butterfly and moth life appears to be the propagation of their species and the beautifying of the world by their marvelous colorings. The poetical idea that the butterfly leads an idle life is entirely erroneous. It flits from flower to flower to sip nectar for its sustenance; it flies hither and thither to find its mate; and during the process of egg laying it may fly miles searching for proper leaves and suitable places to deposit its eggs. Most species die when the egg laying period ceases. Like all other rules in entomology this rule has exception. Few positive statements can be made regarding insects which do not have exceptions. As a rule, an almost invariable rule, you know when your moth or butterfly has deposited all its eggs, for you will find it lying dead in the box or bag.

FORMS AND COLORS OF EGGS.

The forms, colors and sizes of eggs are so varied that you can only learn them by observation. Be sure and have a good lens or magnifying glass for this purpose and each day will furnish surprises which will call forth exclamations of delight. Eggs are round, ovoid, globular, hemispherical, cylindrical, biscuit shaped, thimble shaped, flat, oblong, long, slender, subconic, like a cone, wafer, barrel or turban. They may be smooth, ribbed, bristly, covered with a net-work of cells in all manner of geometric forms, may appear like hammered brass or silver, may be very plain or be wonderfully carved, etched and ornamented. In color, they are white, opaque, pearly, brown, lead colored, golden, pink, green, yellow, blue and all tints and shades imaginable. The experienced entomologist can frequently tell from the form, color and shape of the egg the name of the family and possibly of the species it represents.

HOW EGGS ARE DEPOSITED.

The female moth must deposit her eggs whether she has mated or not. The embryos lie in her abdomen and at maturity ripen rapidly and must be deposited. The pressure of the ripe eggs simply compel egg-laying. There is a small pocket or pouch near the end of her abdomen which is filled with a fluid, if she has mated, and this fluid touches each egg as it passes out and it becomes fertilized. If in freedom the moth may glue her eggs one at a time on the upper or under side of a leaf. Frequently they are laid in rows, or in a number of rows placed side by side with geometric regularity so as to form a little beaded mat. They may be laid in clusters or bands around the stem of the food-plant, may be strung in rows or chains or piled in heaps. They may be dotted here and there on bark or in its crevices, or may be on stumps, boards, walls, fences and under chips and stones. In boxes and bags eggs are deposited on top, bottom and sides in various manners. While feeding take great care not to disturb eggs which are on underside of the cover, if you are using slide boxes.

LENGTH OF EGG PERIOD.

The length of the egg-period varies from about three or four days to almost any number of weeks or months. As a good working rule, however, it may be said that eggs will hatch in three or four weeks. Many species hibernate in the egg stages. Never throw away a batch of eggs until you are absolutely sure that they are infertile and worthless. They should be kept in test-tubes, vials, jelly glasses, capsules or in some convenient receptacle where they can be examined daily. By using a magnifying glass it takes but a glance to ascertain if a given set of eggs have hatched. This part of the work occupies only little time, but like every other detail of this business must be faithfully and conscientiously done. When eggs are extremely valuable they should be examined two or three times a day during the period at which the larvæ are liable to emerge. Of course, when winter sets in, this part of the work ceases until the first warm days of spring. French says: "The time of the egg period, or the time from deposition to hatching varies in different species, depending somewhat upon the temperature. In some species they hatch in from three to four days, as in *Grapta*, *Colias* and *Pieris*. The *Papilios* and *Danaï*s *Archippus* hatch in from four to six days; *Phyciodes* *Tharos*, in from four to seven days; *P. Nycteis*, in twelve; *Limenitis* *Disippus*, in from five to eight; *Argynnis* *Diana*, in fifteen; *A. Cybele*, *Aphrodite*, *Alcestis* and *Atlantis* in from fifteen to twenty, etc."

TAKING EGGS FROM BAGS AND BOXES.

If one has the time it is better to line the boxes containing the females with cheese cloth or tissue paper upon which the eggs may be laid, otherwise they will be glued to the inner surface of the box. Some entomologists obtain eggs by placing females in tin or paper mailing tubes, which they first line with some gauzy material. My mother has discovered that when necessary eggs may be removed from any surface by dexterously inserting the nail of the thumb or forefinger beneath the egg and prying it loose. A little practice renders this safe, but at first you will probably crush a few eggs. It is generally better to chip off thin slices of the surface containing the eggs with the sharp blade of a pen-knife, or cut slips out of the card-board with the eggs upon them and place these chips, slices and slips in the receptacle containing the egg. Paper bags are convenient in this respect, for with a pair of scissors you can snip out pieces of the paper with the eggs upon them. Another discovery made by my mother is that if you detach the egg it is sometimes convenient to lay a small patch of damp cheese-cloth upon them. When the cloth is dry the eggs will be found adhering to the patch. A lot of loose eggs gently shaken from side to side will turn bottom side up and when stuck to the cloth will appear in their natural position.

CARE OF EGGS.

Eggs require very little care. If in tubes corks should not be inserted tightly lest the eggs mould, but only a little ventilation is necessary. Hibernating eggs in tubes should be corked with a loose piece of cotton to admit a slight circulation of air. Do not place eggs in the sun nor let them freeze. All eggs, as well as all larvæ and pupæ, must be shielded and protected from ants, mice, birds, ichneumon flies and numberless other enemies, which are a constant menace to them in their natural state. All hibernating material should be securely

guarded by being in a frame-work covered with cheese-cloth or fine wire netting. In nature it is probable that the greatest loss to lepidoptera occurs in the egg stage. Just as artificial propagation of trout and other fish enables the fish hatcheries to turn out vastly more fry than nature could produce, just so the Butterfly Farmer may hope to improve upon nature's output of moths and butterflies.

FLIES WITHOUT MOUTH ORGANS.

Many of the moths, especially the larger ones, and some of the butterflies have no mouth organs and can neither eat nor drink. These species, of course, do not require to be fed. Place them in a box and they will lay their eggs without further trouble. The mouth organ consists of a long sucking tube, which, when not in use, is coiled on the lower side of the head between two forward-projecting appendages. While the female fly is unconscious after being taken from the cyanide bottle you can easily tell if she has such a proboscis or sucking tube. It will be coiled up under her head like a watch spring.

TIN BOXES.

Eliot and Soule in "Caterpillars and Their Moths" say: "The popular book is wrong when it states that 'eggs must be kept in just the condition of heat, light and moisture in which they were found.' The best and safest way to keep them is to put them in a little circular tin box each kind by itself, marking the box with a name or number which shows exactly what the eggs are or refer to the page of the note book which says where they are found. The little tin boxes which country druggists use for dispensing ointments are excellent egg boxes. Better still are the boxes made in Germany with glass in the top, because in these the eggs can be watched without opening the box." The boxes should be kept in a cool place.

BUTTERFLIES NOT REQUIRING FOODPLANT.

The late W. G. Wright, on page 35 of his "Butterflies of the West Coast," says: "Females of the following names genera will lay their eggs upon anything, even on the net itself, if other matters, such as proper shade, warmth, air and quiet are agreeable to her; *Parnassius*, *Argynnis*, *Euptoieta*, *Neonympha*, all the genera of the family *Satyridae*, and, in part, some other genera." So far as I have experimented Mr. Wright is correct, though I should be glad to receive the opinion of scientists upon this matter and should, if possible, like to learn the names of other families of diurnals which do not require the presence of the foodplant in order to deposit their eggs.

DIFFICULTY OF OBTAINING BUTTERFLY EGGS.

About half of all the butterflies will die rather than oviposit without the presence of their own particular larval foodplant. To get the females to lay, W. H. Edwards used to knock the ends out of a nail keg, place it over the growing foodplant and cover the top with gauze. The butterfly confined in this receptacle would generally deposit her eggs upon the plant. Other scientists advocate placing a frame work covered with gauze or cheese-cloth over the growing plant, or the placing of a living potted plant inside a gauze-covered

cage, or tying the butterfly in a gauze bag over a limb or living spray of leaves and branches. I am led to believe that a simpler and more successful method of obtaining eggs from butterflies is to confine the female in a paper bag, the mouth of which is tied around the foodplant. Whatever method is employed the butterfly must be fed with pieces of apple soaked in honied water as above mentioned, else she will perish of hunger and thirst. Beginners may experiment, if they like, with butterflies which will only lay upon the foodplant, but must not be disappointed if they do not succeed. The female should not be confined in the direct sunlight, nor where ants, or other enemies can enter and destroy the eggs. While living foodplants are always best and are frequently necessary, some butterfly breeders have succeeded in getting eggs by keeping fresh bouquets in water in the cage. If the dried apple is placed in a small dish with a little honey and water, inside the cage it is, of course, not necessary to feed the female every day.

THE NOTE BOOK.

Your constant and indispensable companion in entomological work is a note book. Record everything relating to your work. Faithfully record the dates of egg laying, hatching, moulting, pupation and emergence from chrysalis. Note all foodplants upon which larvæ are found or upon which they feed. Jot down every incident, fact, hint or suggestion which may be of value in the future. If you capture a given butterfly or moth on a given day you will probably find others of the same species on the same date next year and each succeeding year, therefore, every specimen should bear a little label giving the locality and date at which it was taken. In practice, where I take or breed hundreds of specimens in a day, I place them temporarily in cigar boxes with the date marked on the cover. When I get time I pin locality and date labels on each specimen.

HINTS FOR SHIPPING.

On page 12 of this course you were told that boxes containing specimens should be packed in a larger box and protected by excelsior or other soft material to prevent jarring. There should be at least an inch of excelsior between the inner boxes and the outer one, and it should be loosely packed. Do not compress the excelsior or other material, but let it be loose and fluffy. When sending by express the outer box may be pasteboard, providing no paper is wrapped around it. A hat box will pass through the express quite safely if there is no paper wrapped around it, because agents will handle it carefully. If tied up in heavy wrapping paper the frail nature of the outer box might not be apparent. Strong tin boxes wrapped in paper are frequently crushed and the contents ruined, when paper boxes might have arrived in perfect condition if fully exposed to view. All express companies prefer that fragile packages should not be wrapped in paper. This method of packing does not apply to parcel post. If you do not send by express you must take the risk of having your packages crushed by heavier packages. Always place a value on your package. It is not only useful in case of loss but it insures extra care on part of the agent. Section "E" rate given by express companies on packages of less than \$10.00 valuation is 1 cent per ounce.

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THE BUTTERFLY FARMER

A MONTHLY MAGAZINE FOR
AMATEUR ENTOMOLOGISTS



XIMENA McGLASHAN
Publisher and Proprietor
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 Business Manager

*A Comprehensive Correspondence Course in Entomology,
Conducted Under the Auspices of The Agassiz Association,
Will Be a Leading Feature During the Ensuing Year.*

Subscription, in advance, \$5 per Year.

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GENE STRATTON PORTER.

Will entomology become popularized in America? Yes, but not through the works of scientists. Most folks shun science as something entirely too deep and uninteresting for ordinary understanding. Books written for nature lovers, especially if they be exquisite stories, are in great demand, and through such works the public may learn how easy, how inexpressibly fascinating, is the study of moths and butterflies. None of the great entomologists have succeeded in reaching the hearts of the masses as has Gene Stratton Porter's "Freckles" and "A Girl of the Limberlost." Hundreds and hundreds of correspondents tell me that their first interest in moths was awakened by these charming novels. That a girl could obtain money to help her secure an education by gathering cocoons and sugaring



GENE STRATTON PORTER

for moths was a revelation. Every reader is eager for further information. "The Moths of the Limberlost" is an artistic masterpiece. All her writings, "The Harvester," "The Music of the Wild," "The Song of the Cardinal," "What I Have Done with Birds," "At the Foot of the Rainbow," "Birds of the Bible," and lastly "Laddie," give one a liberal education in nature study, and are so ably written that it is no wonder they are read by thousands of readers. She appeals to the soul rather than the brain. Mrs. Porter ranks first among those who are popularizing scientific research. It is a pleasure to present her portrait and pay her this heartfelt and unsought tribute. Just as Harriet Beecher Stowe doomed slavery by her "Uncle Tom's Cabin," so Gene Stratton Porter is dooming ignorance regarding the charms of entomology and nature study with her delightful publications.

ADVICE TO BEGINNERS.

Butterfly farming is an occupation which may be followed by any woman as a pastime, a hobby, a way to earn pin money, or as a business. Many collectors never dream of making money, being entirely content to exchange specimens and form a little private collection of their own. Nature lovers obtain eggs from female moths and butterflies, rear the larvæ, care for the cocoons, and when the adults hatch open the window and let them fly away. They often send orders for cocoons to study the life histories of the different species. Oftentimes the flies which are liberated succeed in finding a suitable foodplant upon which to deposit their eggs and result in adding a new species to that particular locality. Entomologists are fond of studying the "zones" in which species of lepidoptera naturally abound, but this does not prevent species from being artificially colonized in other zones. England, for instance, has few species of butterflies, but scientists are constantly

experimenting to see if other species from America and different parts of the world will not thrive if liberated in considerable numbers on British soil.

By far the greater number of beginners, however, desire to learn this business in order that they may make a livelihood or at least earn some money. Girls who are working their way through school and college, others who are compelled to give up office work on account of their health, and a large class who wish to add to the family income comprise the majority of beginners. Those who are forced to regard the financial side of the business may, after all, develop into the most useful scientists. Under the spur of necessity they will work harder, display greater zeal and accomplish results.

Unless one receives personal instruction from a teacher who understands the business, it is unwise to give up any position which brings in an income until one is quite sure that he understands enough of this business to capture and breed desirable species and market his specimens. One may learn all this during his spare moments and during vacations. Occasionally a correspondent succeeds from the very outset, but the better rule is to be a little patient and do a certain amount of experimenting before one launches into the business. During the summer months I can give personal instruction by which the beginner may learn every necessary detail of the work in one or two weeks, but to learn by correspondence requires a degree of patience.

There is a large demand for eggs, hibernating larvæ and pupæ, and winter is the time to search for these. There are large numbers of collectors who earn good money hunting for cocoons, and while engaged in this work they sometimes discover eggs and larvæ. One correspondent collected over ten thousand cocoons last winter.

TEACHERS' CLASS SUGGESTED.

Prof. Ralph Benton of the Department of Biology of the University of Southern California writes:

"I have looked over your circulars containing invaluable suggestions and am particularly impressed with the record they hold of sustained and careful work, which I venture has proved itself delightful and absorbing. The idea of a comprehensive correspondence course, I think, should prove popular. Anything that I can do to assist you in such a work I shall be glad to do. When it comes to the rearing of bees, a branch of insect breeding which has already developed to something of a commercial point, I can perhaps give you some suggestions, as I have made the breeding of queen bees something of a study for use as material in working out certain scientific problems in insect inheritance in which I have become interested. And since you give the course under the Agassiz Association it will receive my hearty support and co-operation in any way that we can help to make the enterprise a success. I was pleased and delighted to see, the other day, the interest and publicity the Delineator has given to your work. I was interested to note that you are a normal school graduate and continuing your studies in the university. It will be the richest investment (not necessarily from the financial side, but from the side of real living) that you could make.

"In the light of your normal training and in view of the correspondence course in Entomology, I have been thinking of the possibilities of such work in Los Angeles among the fifteen hundred public school teachers we have here. During the past year or two there has been quite a wave of nature study interest, and one or two successful classes among the teachers have been formed. Insect studies

would prove popular among the teachers, I am sure, and I know of no field so rich for nature study in the schools as that of insect breeding and the working out of life histories. I do not know whether this field can be adequately covered by your correspondence course or whether the field might not warrant a few weeks of more concentrated work right on the ground with the teachers in a special class. Such a course might be given either under the auspices of the Agassiz Association or perhaps the university might consider fostering it. In either case you would have to look to the fees for remuneration for your work. However, these details would adjust themselves, the main point being the question whether you could handle the field in your general correspondence course or whether you might not find it profitable to form a class for a few weeks of more concentrated work among the teachers. I do not know whether you would find it profitable to leave your work at Truckee for such an undertaking or not. The correspondence course could be handled from any point. It occurs to me that winter collecting in and about Los Angeles might prove profitable for your work. Whatever you may undertake, I shall be glad to help all I can."

WANTS OF A GREAT MUSEUM.

Henry Skinner, M. D., Sc. D., in charge of the Academy of Natural Sciences, Philadelphia, Pa., writes:

"Many thanks for number one of your 'Butterfly Farmer.' The publication is a good one and I wish it long life and prosperity. I am glad to see you are instructing your correspondents who have commercial tendencies what to do and what not to do. For many months I have been greatly annoyed by persons writing to me to know whether we purchase insects. I have also had many personal visits and phone calls. Of course, you can imagine the torn specimens of *Pieris rapæ*, *Anosia plexippus*, etc., that they wished to sell us. Our collection was commenced over a hundred years ago, and you can imagine it is not a small one. Of course we do purchase desiderata, and, as you say in the Farmer, we would at least like to know what the dispensers have to sell. We want certain rare butterflies particularly and will be pleased to learn at any time what you have for sale among the rarities. I am pleased to see you have changed the form of your publication, as the former long sheets were awkward to handle and care for in a library where most publications are in octavo size. If I can be of aid in your interesting work in any way please let me know. Your work has made a great impression and will do much for the study of lepidopterology. I am not much interested in the commercial part, but feel that it will interest many people who will go into the study for its own sake. In the past there have not been enough people interested to do the work the subject merits."

WHY CALL IT CORRESPONDENCE COURSE.

Almost every one is familiar with what is known as correspondence courses. Every subject that is taught, as far as I know, demands a vast deal of personal work, study and correspondence from the pupil. A correspondence course in entomology differs greatly in many respects from the courses usually advertised. The beginner in entomology wishes to know how to collect, breed and preserve specimens and where to market them. The scientist, who knows far more of these subjects than I do, is satisfied if he gleans some single hint from his fellow scientists which will prove of value. Dealers and purchasers subscribe for the course because it gives them, without charge, an opportunity to find patrons. The

nature lover takes the course to learn how to make life more beautiful. It would be difficult to formulate any fixed inquiries which could be sent to all these varied classes.

Pupils are taking this course who would not care to answer set questions or to do prescribed work such as is usually necessary when one takes a correspondence course. A number of teachers in one school may take a single copy of *The Butterfly Farmer* and all may derive the benefit of any information it may publish during the year. No one of them is required to answer a list of questions tending to show their requirements or proficiency.

Each pupil is permitted and urged to write me regarding their difficulties, the particular things they desire to know, and are especially requested to tell me what they do not understand regarding the business. Such letters arrive daily and are promptly answered. With such a varied class of "correspondents" the "correspondence" involved in giving this course is individual and personal. Sometimes the biology class of a high school becomes a subscriber and each one of its members is requested to write me for the information most desired in his particular case. If my methods of conducting a correspondence course are unique, the business itself is unique. Each correspondent desires knowledge suited to his particular needs and environment, and this knowledge can be obtained for the asking. When questions are asked me in letters which I cannot answer, I try to ask them of some one who can. So many learned men and women are trying to help me that I generally know where to apply for the answer to a difficult question.

Most of the subscribers to *The Butterfly Farmer* are seeking to learn the different methods and views of the various entomologists who are contributors. They wish to do no work whatever in connection with the course, but simply subscribe for this magazine as they would for any other. I receive beautiful helpful letters from this class, but seldom a query. The course, without the magazine, would lack breadth, scope and elasticity. Combining the two, and personally corresponding with each one who desires, I trust to accomplish results.

NAMES OF PURCHASERS.

The following are purchasers of eggs, pupæ or perfect specimens and pay cash for desiderata. They desire price lists. Satisfy yourself of their reliability, make your own contracts and deal with them on your own terms and at your own risk. All subscribers who are purchasers and all who have specimens for sale or exchange may advertise under this heading without charge:

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ENTOMOLOGICAL JOURNALS.

A partial list is here given of the entomological journals of America. Additions to this list are requested:

Canadian Entomologist, Entomological Society of Ontario, Guelph, Ontario, Canada, \$1 per annum.

Entomological News, the Academy of Natural Sciences, Logan Square, Philadelphia, Pa., \$1 per annum.

Bulletin of the Brooklyn Entomological Society, Central Museum, Eastern Parkway, Brooklyn, N. Y., \$1 per annum.

"Psyche," Bussy Institution, Harvard University, Forest Hill, Boston, Mass., \$1.50 per annum.

Insecutor Inscitiæ Menstruus, Harrison G. Dyar, 1512 Twenty-first Street N. W., Washington, D. C., \$2 per annum.

Journal of Entomology and Zoology, Pomona College, Claremont, California, \$1 per annum.

WANTED.

Transactions of the California Academy of Sciences, 1901, No. VIII. Anyone having that volume for sale will please communicate with Rensselaer J. Smith, M. D., Milpitas, Santa Clara County, California.

List of the Coleoptera of America, North of Mexico, by Samuel Henshaw (new or second-hand). Ximena McGlashan.

THE GUIDE TO NATURE.

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CORRESPONDENCE COURSE IN ENTOMOLOGY.

Conducted Under the Auspices of The Agassiz Association.

Lesson III. THE LARVA.

NO FIXED RULE CAN BE GIVEN.

Many of my pupils of the past year are successfully rearing larvæ and you will find it an easy and delightful occupation. No fixed rule can be laid down which will apply to all species, but general instructions can be given which will enable you to rear most varieties. If you wanted to know how to raise flowers you would be content if told how to grow most varieties and would not be discouraged to learn that some varieties are delicate and require special treatment. Many species of larvæ are comparatively hardy and will give you little worry, but others require extreme care and peculiar environments. Until all kinds have been reared, no entomologist would pretend that he could write this lesson in such a manner that it would give complete instructions regarding the subject. It is not difficult to tell you enough to serve your present purposes, but experience and close observation will teach you many valuable things which will be new discoveries to even the scientists. Despite the age of the science of entomology, the rearing of larvæ presents opportunities for original discovery by those who are beginners.

SCIENTIFIC WORKS SILENT ON SUBJECT.

Every entomologist who rears larvæ learns from experience a large number of facts which would be of importance to the beginner, but which are never given publicly. They go down to the grave with the entomologist unrecorded and are lost. Scientists write large and costly books describing each particular molt of each particular larva reared, but tell little or nothing of how they overcome the perplexing difficulties of the process of rearing. The student searches their tiresome and ponderous writings in vain for instructions as to how the work is accomplished and must discover the details from experience as they did. The Butterflies of North America, in three volumes, by W. H. Edwards, cost something like \$150, and are invaluable to learned scientists, but they nowhere give the information which was the most valuable part of the author's knowledge, namely, the details of caring for the larvæ. Every beginner meets with disappointments and discouragements which would be removed had scientists published the little secrets they discovered regarding the rearing of the different species. I do not imagine they intentionally try to conceal information. They write books for scientists, not beginners.

WHEN THE LARVAE HATCH.

It is perfectly proper to speak of larvæ hatching, but in reality nearly all of them eat or nibble their way out of the shell, and most species, after getting into the world, make their first meal off the remnants of the egg shell. If the larva is that of a very small butterfly or moth it will be so very small that you will probably need a magnifying glass to see it, and your first impression as you endeavor to examine the eggs will be that something has destroyed them. The eggs will have disappeared and you will not at first discover the caterpillars. They make their first meal off their egg-shell, but will soon demand other food. Fresh and tender leaves of the foodplant must be introduced promptly and when the larvæ have collected upon them these leaves should be transferred, with their

precious burden, to a jelly glass. If you knew the name of the mother moth or butterfly you will have consulted the Foodplant Charts and will have the leaves of one or more plants upon which the larvæ will feed. If several plants are named in the charts as acceptable to that particular species put in leaves of all and ascertain which they prefer. Of course, the kind of leaves upon which most of them congregate and nibble indicates their preference. Feed them upon their favorite and do not change it for another during their entire life in the larval stage. To change the foodplant after they have been accustomed to its leaves is often injurious and frequently fatal, even though they might have subsisted from the outset upon the plant which you substituted. They should be kept in a shaded place, not cold and not over-heated.

WHAT IF YOU DO NOT KNOW THE FOODPLANT.

When nine out of ten batches of moth eggs hatch at my farm I do not know the foodplant upon which the larvæ will feed. When you send eggs to some scientist across the continent, if he does not know the species of the mother fly he has not the slightest idea of the food which the larvæ require. You are instructed to get eggs from every battered female, if possible, yet when the eggs hatch you will not have the slightest idea what food is necessary. You and I, however, have one great advantage over the distant scientist. We know that the mother was produced by a caterpillar which fed upon some plant which grows in our locality and if we offer the leaves of all the plants in our neighborhood we are sure to find the right one. The scientist does not know that, for it is quite possible the natural foodplant does not grow where he lives. He must find something "just as good." When your eggs hatch and you do not know what to feed the larvæ, find out. Invert the jelly glass and on the inside of the tin lid place little slips of twenty different leaves. If they eat any one you have made the discovery. After three or four hours if they do not cluster upon some leaf introduce slips of twenty other plants, and after three or four hours, of twenty others, and so on until you discover the right plant. It is fortunate that nearly all larvæ are satisfied with the leaves of many different plants, and in practice it is not generally difficult to discover a suitable food. Scientists like to know the natural foodplant of larvæ, but the butterfly farmer is content if he finds something upon which they will subsist. I wish to urge you to jot down in your note book the name of each foodplant you discover. If you do not know its name send me the plant by mail. If possible, send root, plant, flower and seed.

DIFFERENT STYLES OF CAGES.

Some authors advocate using glass tumblers inverted over sheets of paper, for cages, and this method is well suited for school rooms where individual caterpillars are raised. Other writers tell us to invert jelly glasses, without covers, over a cloth-covered table. Each book-maker gives a little different method for confining the larvæ while they are feeding, and each method may be successfully tested. A large lamp chimney covered with gauze or netting may be placed over a growing plant and makes a good cage for some species.

Geo. D. Hulst says: "Ordinary breeding boxes are made, if small, with glass front, with netting on either end, with a door behind through which the food can be changed, and the box itself easily cleaned. If large, a space at each end covered with gauze will suffice for ventilation, and the top can be arranged with a movable frame closely fitting and covered with close netting or gauze. It is preferable, we think, in large boxes to have them without bottom. They can be placed upon the ground and moved as cleanliness demands."

MOLTING.

Caterpillars grow in a peculiar way which is termed molting. When a few days old, they lie dormant for awhile, then the skin splits on the back of the thorax and is cast off, and they appear in a new and larger skin. This process is repeated four or five times during their lives. Eliot and Soule, in "Caterpillars and Their Moths," say: "Most caterpillars molt four times, a few less often, and some oftener. Ten molts are the largest number so far observed in any species." During the molting period larvæ should not be disturbed. Under the best conditions it is a critical period in larval life and under the best of care many will sometimes perish. Just after they have molted their skins are extremely delicate and tender and fatal results will follow if they receive slight injury.

TIN BOXES AS CAGES.

Eliot and Soule urge the use of tin boxes. They say: "When the caterpillars hatch they may be put into boxes a little larger than the egg-boxes—still round ones, with scrim on top, young and tender leaves inside, and the cover shut tight over the scrim. The leaf or leaves should be sprinkled, for the little crawlers like water. It is a good plan not to move them from the egg-box until it is certain that they do not mean to eat any more shell. They never nibble the egg-shells after eating leaf-pulp. We soon learned that leaves did not keep fresh half a day in open or pasteboard boxes; we found that bottles of water in cages or boxes were a source of danger to the caterpillars and a trouble to us; so reasoning that plants would keep fresh a long time in closed tin boxes, and that caterpillars needed very little air, we tried the experiment of putting our sprays of leaves into water for an hour or two (as we should put flowers we meant to send away in boxes), and then putting them into our larva-tins for the caterpillars to eat, or into our big tin boxes to be kept till needed. We watched our first tins of caterpillars very closely, and soon satisfied ourselves that the crawlers certainly grew as fast and as large as when in the open air, while the leaves kept far fresher than in bottles of water in open boxes or cages. Moreover, no parasitic flies can sting them in these tins, unless they are put in with the leaves, and this chance is very small. We believe we have had one instance of it, and only one. The tin boxes protected the caterpillars from mice also, while in more than one case our 'best specimen' had fallen a victim to mice when we used cages or netted boxes. The piece of scrim over the top of the box should be large enough to hang down on all sides for half an inch or more. We found that we occasionally beheaded a caterpillar in putting on the box-cover before we used scrim, but we have had no trouble since. With several very lively crawlers in a large box it is difficult to be sure that all are safely out of harm's way, especially since some species are much excited by light and crawl toward it very fast. The scrim keeps them away from the edge and saves some lives. Leaves should not be left in the tins after they begin to lose their freshness, or after the caterpillars have eaten a part and abandoned them. Fresh food and plenty of it, a few drops of water, clean tins, and no crowding are the essentials."

GLASS JARS WITH TIN COVERS.

Excellent success may be obtained by rearing most all kinds of larvæ with fruit jars, candy jars, tobacco jars, Horlick's Malted Milk jars, and others which have screw tin-tops. They can be removed and replaced without loss of time, and so long as only a few larvæ are in each jar they seem to have an abundance of air. Possibly, as some scientists have suggested, the larvæ having been accus-

tomed to these conditions, accommodate themselves to their environment. A large covered cage containing a pot of the living foodplant, or jars of water filled with fresh bouquets of the foodplant, are undoubtedly best, and correspond with the conditions which nature provides, but you may rely upon the assertion that larvæ will live, thrive and mature in jars. Jelly glasses will answer every purpose during the first and second molt, but after that use jars of at least one or two quarts capacity. For large numbers of caterpillars boxes and barrels covered with gauze give good results. Most authors will tell you the advantages of having breeding cages. The entomological supply houses advertise several forms and varieties. If money is no object, get as many kinds and as many of a kind as you like. I have successfully used a number of these and acknowledge their advantages, but I tell you frankly that you can obtain just as good results from these homely appliances which I recommend and which cost little or nothing.

TRAYS AND TANGLEFOOT.

Harry S. Smith, Superintendent of the California State Insectary at Sacramento, gave me a most valuable hint regarding rearing larvæ in shallow trays around the edges of which was smeared a band of tanglefoot. The tray may be of any convenient size, say 18 x 20 inches, and the sides need not be higher than three or four inches. Tree tanglefoot answers every purpose and can be obtained in one-pound tin cans. It is sold by The O. & W. Thum Co., Grand Rapids, Michigan, and the C. B. Jennings Co., 24 California Street, San Francisco, California, and costs about 25 cents a can. Paint or daub this on the inner surface of the top of the sides and ends of the tray in a band two to four inches in width and your larvæ cannot crawl out of the tray. No cover is needed, and each day's fresh food may be placed on the tray by the side of the food of the preceding day. The larvæ will crawl on the fresh food and every few days the old food may be removed and the tray cleaned without ever disturbing the caterpillars. Mr. Smith informs me that seventy thousand larvæ of the Gypsy Moth were successfully reared at the Massachusetts State Insectary in one tray about 9 feet long by 3 feet wide. Several trays may be placed one above the other in a rack. A small brush and crumb tray are useful in cleaning the trays. My experience leads me to believe that this is the best method of handling large quantities of larvæ. Care must be taken that the branches of the foodplant do not reach over the top of the tray, else the larvæ will escape. The band of tanglefoot may be placed on the inside of boxes and barrels near the top. Orchardists paint bands of Tree Tanglefoot around their fruit trees and vines and no larvæ will attempt to climb up the trunk or stem thus protected. To protect the trays from ichneumon flies, dust and other enemies, the racks containing the trays should be surrounded with cheese-cloth or fine wire screen. Coffee barrels lined with heavy pasteboard form excellent breeding cages if there is a band of tanglefoot around the inside near the top.

REARING LARVAE ON GROWING PLANTS.

It would seem to be an ideal way to rear larvæ upon the living, growing plants upon which they feed. It saves all the trouble of gathering the food and would seem to be the most desirable method. Where caterpillars feed upon the leaves of a tree they may be confined in gauze bags tied around the branches, and when the leaves of a given branch have been eaten extend the bag over another limb, and so on. If the bag is large you can enclose the fresh branch by the side of the old one and when the caterpillars have changed their abode the old

one can be removed. When the larvæ are nearly full grown they can be changed to breeding cages to enter the pupa state. But while this seems ideal, there is much risk from enemies which may infest the soil of a growing plant or may enter the bag through crevices or irregularities in the bark of the limb. Besides, many larvæ will eat holes through the gauze and escape, especially when the time of pupation approaches.

THE LARVAE OF BUTTERFLIES.

In the preceding instructions I have had specially in mind the larvæ of moths, especially when I spoke of jars. Feeding at night and concealed during the day, they require very little light and will thrive with very imperfect ventilation, as a rule. The larvæ of diurnals I prefer to raise in gauze-covered boxes or barrels, in cages covered with cheese-cloth or in open trays. They require far more light and ventilation and are subject to different rules. The vast majority of species have no use for earth. They are generally day feeders. When the time of pupation arrives some provision must be made for the chrysalides. Many kinds spin a button of silk which often resembles a little rosette and from this their bodies are suspended by the tail. In addition to this caudal attachment some species support the chrysalis by a thread or filament at each side. Nearly all the butterflies and such moths as spin cocoons should have access to the sides and top of cages or be provided with twigs and branches in which to pupate.

EARTH IN CAGES.

Earth in the bottom of the jar or cage is almost necessary to the health and comfort of many species of larvæ. The Noctuæ especially will hide away in the earth during the day, and many varieties, like the Catocala, are fond of clean litter in which to conceal themselves during the daytime. Until you learn what species require earth and clean leaf mold it is a pretty safe rule in this regard to supply all night-feeding larvæ with from two to four inches of earth. Light, sandy loam is recommended, but the soil of the door yard, forest or hillside will answer.

BAKE EARTH AND LEAF MOLD.

Gene Stratton Porter recommends that you sift and bake all the earth which you place in breeding cages in order to be sure it contains nothing in the way of insect life which will prove injurious to your larvæ or pupæ. Among countless causes of death and disease among larvæ are undiscoverable enemies which are hidden in the earth, and which lurk among the leaves of the foodplants. Sifting and baking the earth and leaf mold in a hot oven eliminates the first danger and careful scrutiny of the leaves will generally avoid the second. Scald your breeding jars occasionally, scald the sand in your relaxing boxes and the moss or sphagnum in which you keep your pupæ, and after scalding them bake them in order to destroy all forms of germs.

LETTING LARVAE HAVE WATER TO DRINK.

Breeding cages should be kept in a light, cool place. The heated atmosphere of living rooms, especially where there are fires, is not healthy. Careful entomologists recommend spraying the food of larvæ with an atomizer when the larvæ first hatch, and spraying the leaves of the foodplant frequently. With certain species this is doubtless advisable and is possibly necessary. In my experiments, however, I am afraid that I have killed more caterpillars by drowning them than would have perished from thirst. If you put in too much water the little larvæ will often drown; they sometimes seem to drown in the misty film which

gathers on the side of the jar. Moreover, if the leaves are too wet and the ventilation of the cage is poor, bad results will follow. I take it that each author has in mind his own special forms of breeding cages and when he lays down rules they apply to these cages. I am speaking of glass jars, and the green pulp of the fresh leaves and the moisture of the early morning dew generally afford sufficient moisture for larvæ. Hot, dry air, parched and shriveled food, may necessitate sprinkling or spraying, and I nearly always give water to larvæ except when confined in jars.

LIGHT, AIR AND CLEANLINESS.

• A degree of cleanliness is absolutely indispensable at all times and under all circumstances. Filth and mold are fatal, still it is just as fatal to larvæ to disturb them when they are molting, or to handle them or to worry and distress them in an effort to keep them over-clean. Light is generally regarded as necessary, but the direct rays of the sun will destroy most species of larvæ. Certain kinds demand ventilation, but not nearly to the extent which most writers claim. Larvæ do not have lungs and the majority of varieties thrive with little air. Once a day remove the screw top from your fruit jars, with a pair of forceps take out the old food, clean the jars if it appears necessary, and put in your fresh food. During this process sufficient fresh air will enter the jar to last for another day. Frequently it is easier to transfer the caterpillars to a clean jar in order to cleanse the old one.

OVER-CROWDING.

The most serious mistake of the beginner is apt to be trying to rear too many larvæ in one receptacle. If you are using large trays there is no danger whatever in this respect. If the tray is large enough you can put in an armful of fresh feed each day and the old food can be thrown away when the larvæ have deserted it. In large breeding cages the same conditions prevail to some extent, but I have frequently lost an entire family of larvæ in quite a large cage, even though I kept it scrupulously clean and took every known precaution except one, and that was over-crowding. While larvæ are molting they will often receive fatal injuries by having their companions crawl over them and disturb them. Besides, diseases break out which frequently sweep away the entire brood. You will make no mistake if you keep dividing and sub-dividing the members of a large family. I sometimes wonder if those who are sticklers for ventilation are careful enough regarding this point. A two-quart jar holds an abundance of air for two or three or perhaps half a dozen large larvæ, when a hundred or even a score would be exterminated perhaps from lack of air, or perhaps from some other cause. A large Sphinx larva will live admirably in a fruit jar. but it would be folly to try to raise a large number of them in one jar. Of course, you have more work in supplying the occupants of many jars with food than you would if all were in one receptacle, and I suppose that is the true reason for over-crowding larvæ.

COLLECT LARVAE.

• Never fail to collect larvæ which you discover on your rambles. Carry them home in boxes, bottles, or even in paper bags. In this way you may rear varieties which you would never discover. There are many moths which do not come to light or sugar and can only be taken in the larval stage. My sister June, when not quite five years old, found a queer caterpillar on *Penstemon*, and the butterfly which emerged was named *Melitæa mcglashani*. *Hemileuca burnsi*

was produced from larvæ which the young son of Mr. Fred Burns found on the white sage (*Artemisia ludoviciana*). Do not despise the commonest caterpillars. Species may abound one year and be scarce for a number of years. In the early 'seventies my father was offered one dollar apiece for *Vanessa californica* and could not obtain a single specimen. There have been four different years since then when untold thousands of this species could have been gathered at Truckee, when their larvæ almost could be termed a pest, and the chrysalids could have been collected by the peck. But if a given species is always plentiful in your locality it pays to raise a few hundreds. You can easily store away a thousand specimens, papered or pinned, and you can dispose of them at some price. You sometimes find sports, freaks or aberrations, which are varieties which differ in coloration from the typical form, and these bring fancy prices. Larvæ which are gregarious are reared with slight effort and need not be taken from the bushes until near pupation.

GEOMETRID LARVAE.

Never fail to gather Geometrid larvæ. You will probably exclaim, if you are a beginner, that you don't know what they are, but you do. They are slender and naked, usually with only two pairs of legs, though rarely they may have three or four pairs. Lacking the number of legs which most caterpillars enjoy, they travel by a grotesque method of looping up their bodies. They are usually called measuring worms, or inch worms. "Geometer" originally means "land-measurer." Many scientists desire to purchase Geometridæ. Dr. J. H. McDunnough, 152 Prairie St., Decatur, Ill., writes: "I should advise your trying to raise from egg and larva as many of the Geometers as possible. As they are delicate, it is almost impossible to get good specimens on the wing." Louis W. Swett, 501 Washington St., Boston, Mass., says: "Geometrid larvæ are very easy to rear, except such as hibernate, which are very few in number." When you capture Geometrid females, by all means try to secure eggs. The greater number are good egg-layers.

DISEASES OF LARVAE.

Sick or dead larvæ should be promptly removed, and unless of rare varieties, should be destroyed. If a contagious disease appears destroy every infected caterpillar. Cleanse the box with carbolic acid diluted with water, or place it for a day in a tight chest containing formalin. So little is known of the diseases of larvæ that remedies are out of the question. If a species is especially valuable isolate the sick larva and vary its surroundings. Perhaps the air in the cage is too dry, or too moist, or insufficient. The sickness may be the result of overcrowding, of unsatisfactory food, of filth or decay, of too little or too much light, or it may be occasioned by parasites. Fungus is a dread foe of caterpillars. Sometimes the odor of carbolic acid or creosote prevents fungus. Be always on your guard against parasites. Save all parasitic insects and send them to insectaries or to me for study.

HIBERNATING LARVAE.

All who have tried to rear hibernating larvæ know that a large proportion will not live until spring. Perhaps the mortality is great when they hibernate naturally. Hulst says: "If kept too dry they die from lack of moisture. If kept too moist they are apt to die from fungus. The efforts should be to keep them at a temperature as steady as possible, and below the freezing point. They should be kept moist, but not wet. The air ordinarily contains sufficient moisture

for that purpose. And they should be kept under circumstances so the air about them is very slowly but continuously changed. Of course, their surroundings must at all times be cleanly." I have tried cold storage rooms for hibernating larvæ, put them in a cellar, and buried them in the earth. Some live, some die. If you have had good luck with hibernating larvæ tell me your process.

DEVASTATIONS OF CATERPILLARS.

When your larvæ die despite your utmost care, solace yourself with the fact that it is providential that they not only have myriads of enemies, but are subject to many diseases, and at best have a frail tenure upon life. If there were no ichneumon flies, no ants, toads, spiders, or other enemies, diseases or other causes of mortality, the larvæ of lepidoptera would utterly destroy every vestige of verdure on the earth's surface within three years. As it is, they consume annually one-tenth of the vegetable world. So say scientists.

FOODPLANTS IN WATER.

W. H. Edwards, the great authority on rearing butterfly larvæ, wrote: "I have never used what are known as breeding cages, which are expensive if purchased, and are troublesome to make at home. For large larvæ, as of the *Papilio*, I generally use powder-kegs (wood) or nail-kegs, one or the other of which can be had anywhere. Remove the top hoop and use the second one to bind down the cotton cloth cover; put a little earth in the bottom, and on it set a two-quart fruit jar filled with water, in which branches of the foodplant are placed. No further care is required than to substitute fresh branches for the old ones as the leaves are consumed, and the larvæ will go on to pupation. This is when it is desired to get chrysalides by wholesale. Where observation of the larvæ is necessary, glass tubes and tumblers, and gauze-covered flower pots, and tin pails and nail-kegs, will answer all the purposes of elaborate and expensive cages, and be more satisfactory, I apprehend. At any rate, all my work is done in this way."

HAVE FOODPLANTS ACCESSIBLE.

Transplant, if possible, to your dooryard, or keep in pots or cans, such plants as you will surely require. Each locality will require a separate list, but at Truckee I have ready access to willow, violets, pansies, clover, alfalfa, grasses, asters, wild cherry, currant and gooseberry, apple, pear, plum, cottonwood, pine, fir, larch, lilac, ceanothus, dog-wood, Bigelovia, two varieties wild sage, wild coffee, wild rose, hops, nettle, azalea, sun-flower, milkweed, lupine, columbine, penstemon, wild pea, celery, carrot, parsnip, lettuce, turnip, mustard and thistle. When I receive eggs from a distance I write the florist for such plants as are necessary. Frequently seeds are sent me by correspondents. For instance, Prof. R. R. Rowley, of Louisiana, Mo., sent me various kinds of seed, such as honey locust, *Croton capitatum*, etc. If you send me seeds in advance of the eggs I can rear the plants under glass. It is well for each pupil to acquaint himself with a list of the natural foodplants of his locality and secure others. Cans, with a few holes punched in the bottom, are better than flower pots for growing plants. I cannot tell you why, but it is true.

EXPENSIVE AND ELABORATE QUARTERS.

Breeding cages may be very elaborate, very costly, very beautiful. You can exercise any degree of taste and invest any amount of money in fitting up suitable homes for your larvæ. There are farms in Europe whose conservatories, exotic shrubs and trees, exquisite cages and paraphernalia represent an expenditure of hundreds of thousands of dollars. A single butterfly raised in one of these palatial establishments is said to have sold for \$5,000. European correspondents have sent us photographs and descriptions of breeding cages and breeding quarters that are so elegant and attractive that I am led to wonder why all millionaires do not embellish their grounds with these magnificent attractions. If grand conservatories are considered desirable adjuncts to a perfectly appointed mansion, if aviaries of rare song birds and those with beautiful plumage are delightful acquisitions, if magnificent aquariums lend their charms to entertain and instruct, why should not elaborate quarters be provided for the rearing and appropriate display of God's most enchanting creatures, the gorgeously colored moths and butterflies?

Could anything be imagined which would out-vie in splendid beauty and fascinating loveliness the possible attractions of a butterfly farm artistically fitted up and maintained, in which the inexpressible splendors of native and exotic lepidoptera could enthral beholders? If "thrills" are largely sought by the wealthy for the entertainment of their guests, why do not decorators study the possibility of butterfly palaces for the embellishment of the residences and grounds of millionaires? If you and I can propagate such startlingly beautiful creatures with a few jelly glasses, bottles, jars, boxes, barrels and trays, what could be produced with unlimited means and opportunity? I am rather "short" on millionaire friends; perhaps you had better suggest this idea to some of yours.

(N. B.—TO ENABLE ME TO GIVE MY PERSONAL INSTRUCTION BY LETTER TO EACH PUPIL THE CORRESPONDENCE COURSE WILL BE LIMITED. ONLY A SMALL EDITION OF "THE BUTTERFLY FARMER" IS PUBLISHED, AND ALL SUBSCRIPTIONS DURING THE YEAR WILL BEGIN WITH VOL. I, NO. 1).

Address all letters: (MISS) XIMENA McGLASHAN,

Truckee, California.

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VOL. I

DECEMBER, 1913

No. 4

THE BUTTERFLY FARMER

A MONTHLY MAGAZINE FOR
AMATEUR ENTOMOLOGISTS



XIMENA McGLASHAN

Publisher and Proprietor

TRUCKEE, CALIFORNIA

C. F. McGLASHAN { *Associate Editor*
 Business Manager

*A Comprehensive Correspondence Course in Entomology,
Conducted Under the Auspices of The Agassiz Association,
Will Be a Leading Feature During the Ensuing Year.*

Subscription, in advance, \$5 per Year.

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DENTON BROTHERS' MOUNT.

Every beginner should start a collection. Save a perfect pair of every species. If you have little money keep your specimens in cigar boxes lined with cork or cork-linoleum. All dealers sell insect boxes and the Schmitt is the best. Thebaut Bros., 861 Folsom Street, San Francisco, Cal., make an excellent pasteboard box which sells, unlined, for twenty-five cents. Naphthalene cones or flakes, or moth balls, will keep out dermestids.

If you can afford it individual mounts are attractive, and unless you intend to make a large collection, are frequently desirable. I like the Denton Brothers' Mount figured on preceding page. It is simple, neat and strikingly effective. This is not a paid advertisement, nor will you see one in this magazine. All subscribers may advertise free of charge, but Denton Brothers are not even subscribers, nor have they requested any mention. Their exquisite mounts speak for themselves and require no advertising. Their address is "Denton Road, Wellesley, Mass.," and upon application they will send you price lists and description.

In one of their letters is the following: "We wish to congratulate you on the good work you are doing. We started in as boys, collecting for our own amusement, and it has developed into a life business. How we would have liked to have had the help you are giving young collectors."

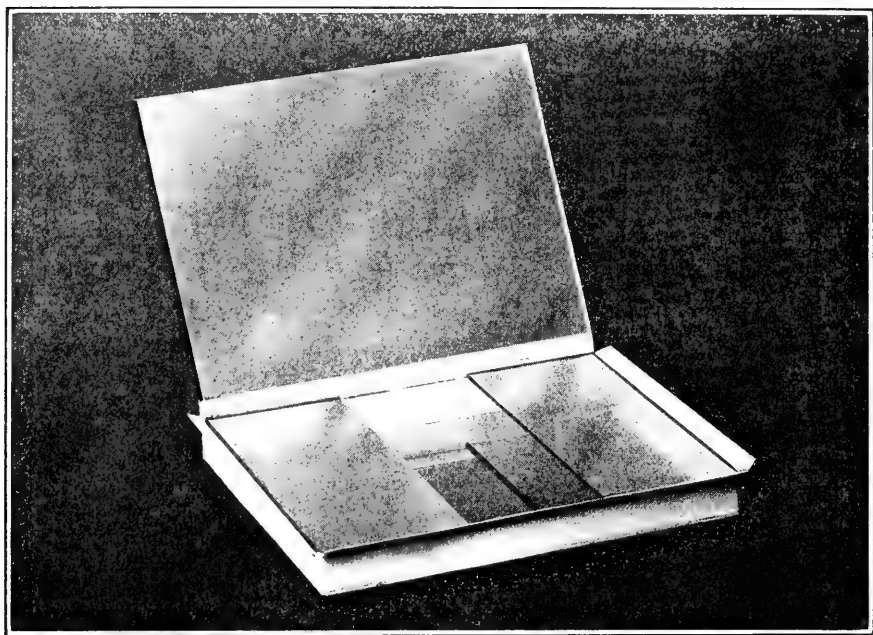
COLLECTING HEMIPTERA.

J. R. de la Torre Bueno, 25 Broad Street, New York, N. Y., writes: "I shall be only too glad to furnish you with any information you would like to have in regard to collecting and preserving Hemiptera. As a matter of fact, I have largely developed my own methods by practice and observation, owing to there being so little about the subject in the books. Without doubt, by far the best way to get the most land bugs, as regards numbers and species, is with the sweeping net. Mine is made of unbleached cotton, I think, very heavy but quite pliable. I have tried duck, but it is so stiff that it stands right out and bugs fly up out of it without any trouble. It is about a foot across, and the ring is one piece of one-eighth steel rod. The bag is bound around the top with leather to the depth of about an inch and a half and a wire run through it, copper, preferably, as it is more pliable. There are holes about two or three inches apart punched along the upper edge of the binding, and through these and under the wire I put the little split rings you can buy for about five cents a dozen at any hardware store. These can then be put over the ring from the end, and you have a very strong net, which will last for a very long while without having to be renewed. Mine is now three years old, and is beginning to get thin at the bottom, in front. At such times, I simply change the net around and shift another part to the front, and there you are.

"Howard's Insect Book is one of Doubleday's Nature Library and you can get it for \$3 or less, perhaps. So far as treating of Hemiptera goes, there are no works published in this country which give an adequate treatment of the subject. In consequence, I have in hand a Hand Book of the Order, covering the Eastern United States, but I shall likely include in my tables many Western genera and even species.

"I received the other day your Butterfly Farmer, and it is very interesting as showing what can be done by a person of intelligence and energy in developing almost any line. You have my hearty congratulations and best wishes. Also, I

DENTON'S PATENT TRANSPARENT MOUNT.



Glass Mount Ready to Receive Butterfly.



Glass Mount Closed Showing Butterfly.

shall be glad to furnish you with any information you may want in regard to Hemiptera.

"Of course I shall be glad to receive what Hemiptera you have caught and will send some of them back to you mounted and named for reference. But I want to warn you against putting different orders of insects in the same bottle—you have the trouble of going through them and picking them out later when you want to dispose of the separate kinds. The best way to do this is to put the whole lot into a white saucer, or a clear glass dish over white paper, the latter being preferable. Then with a pincers, very soft and springy, so as not to have to use much force to bring the ends together, you pick out your bugs right into other bottles with fresh alcohol. Do not let anybody lead you into the temptation of using formaldehyde instead of alcohol—this stuff makes insects preserved in it hard and brittle and is therefore entirely unsuitable for this use. I feel pretty sure that what you have in Hemiptera will turn out of use to me, as there is very little California material to be had on account of there being no collectors of Hemiptera in that state. So send them on as soon as you can, and be sure of my best thanks."

PACKING BEETLES FOR SHIPMENT.

Never place beetles in direct contact with cotton, for the legs, claws, and appendages become entangled in the fibres of the cotton and are apt to be broken. Put the beetles in layers of tissue paper between the layers of cotton. Relax beetles, just as you do moths and butterflies, before packing, otherwise you will be almost sure to break off delicate members and render the specimens imperfect. Beetles must be packed so they will not jostle about.

W. C. Dukes, of Mobile, Alabama, places beetles between squares of surgeon's lint from half an inch to two inches in size, according to the size of the specimens, and folds these squares in a piece of heavy writing paper. If squares of lint are small the paper may be, say, 3x4 inches. Fold each side of paper one-third of the width and the folded paper will be an inch wide and four inches long. Place the specimen between the squares of lint in the middle of this folded paper, fold ends over each other the folds being a little way from the edges of the lint. The paper thus folded will be, say, 1x1½ inches in size. Tuck one end into the other and you have a firm, compact envelope. Lay the envelopes side by side on their edges, not one above the other. Line your shipping box with cotton on bottom, sides and ends. On the outside of each envelope write the number of specimens contained therein with date, locality, and name. Small beetles may be glued to a piece of paper or cardboard with common mucilage, somewhat thicker than it is generally used. Small beetles are easily handled by using the moistened end of a fine camel's hair brush. When possible, put them on the card in sets of four, two males and two females. Place the cards between the pieces of lint. Instead of lint you may use any soft material which does not have a decided pile. Sheet wadding is excellent if lined with tissue paper.

Rensselaer J. Smith, M. D., of Milpitas, Cal., uses paper pill boxes of suitable size, say an inch and one-half in diameter, each of which contains two circular pieces of sheet-wadding and two pieces of circular tissue-paper, and between the layers of tissue paper he puts the specimen. The sheet-wadding is, of course, above and below the tissue paper. Pill boxes can be obtained by the gross at any drug store at little cost. The circular pieces are cut in large quantities and placed in the boxes ready for instant use. The beetle, or a number of beetles, if they are small, can be placed between the layers of tissue-paper at the time they

are taken from the cyanide bottle. The date, locality and name can be penciled on the outside of the pill box. To cut the circular papers and cotton, take about twenty-five sheets and cut them in squares a little larger than the desired size of your circle. Place these squares between two silver dollars and trim with scissors. Of course the pill boxes can be packed between layers of cotton in a cigar box.

Robert James Sim, Jefferson, Ohio, ships beetles in capsules such as are used in putting up medicines for horses and cattle. They can be purchased of any druggist very cheaply and of any requisite size up to about four inches in length. If the beetle does not entirely fill the capsule the two ends may be cushioned with lint, tissue-paper, sheet-wadding or other soft substance. Slips of paper containing the name, date and locality can be put in the capsule. Packed in cotton these capsules are ready for shipment. Mr. Sim learned this method from Prof. E. C. Van Dyke, University of California, Berkeley, Cal.

Cigar boxes and even strong tin boxes are frequently crushed when sent by parcel post, unless there be an outer covering of excelsior about the box. Too much care cannot be taken in preparing specimens for shipment or protecting the package against loss or damage in transit. The safest method is to have two boxes, an outer and an inner one, with plenty of loosely packed excelsior surrounding the inner box.

DISEASES OF LARVAE.

R. W. Glaser, Bussey Institute of Harvard University, Forest Hills, Mass., writes: "I am making the diseases of caterpillars my thesis work here at Harvard under Professor W. M. Wheeler, and would like to know whether in your breeding work you ever came across dead flaccid larvæ hanging by their prolegs. The interior of such caterpillars is entirely disintegrated and when disturbed they go all to pieces. I have bred thousands of caterpillars and have found this disease in *Euvanessa antiopa*, *Hemerocampa leucostigma*, *Malacosoma americana* and *distria* and in *Porthetria dispar*. I should be very grateful to you indeed if you would send me any such material which you might chance to run across from time to time. As to how you had best send me diseased material, the distance from coast to coast is so great that dead specimens would probably reach me in a frightful stage of decomposition. Still, it is best to take a chance and decide later as to the advisability of such a procedure. In case the larvæ are dead, just put them in a vial or small box and ship. If they reach me in such a state that I would be unable to determine the organism which causes the disease, I will try to think of some other scheme for shipping. Of course, material which is diseased but still alive ought to flourish long enough if food is placed in the box and a few holes punched in the lid.

A WORM THAT CARES.

Ximena McGlashan in "The Canadian Entomologist."

Does the worm have care or thought for the adult it is to produce? Many writers assert that there are no signs of sentiment in any of the stages of moth or butterfly existence. They say the mother fly lays her eggs because of natural law, the eggs hatch because they must, the larvæ simply live to eat, and the chrysalis, however wonderful, is only a part of the process. That it is all very interesting, but the mother never sees nor cares for her progeny, nor does the offspring care for anything but itself. If one were to cross pens in a friendly tilt with these writers, the

best illustrations of loving care would doubtless be sought in the pains and trouble which the mother fly manifests in depositing her eggs, or in the solicitude of the larva for the protection of its pupa.

In my home at Truckee, California, there is a species of *Cossus*, which Barnes and McDunnough say is "probably *Cossus angrezi* Bailey," which lays its eggs under the bark and in the wood of the cotton-wood tree in August. The female will oviposit if confined in a paper bag, and lays more than a hundred eggs; but, if allowed to have her own way, she hides each egg in the wood or bark of the tree. The larvæ burrow into the interior of the trunk, and up to the time when they wish to pupate they are entirely hidden from view. They pupate in the bottom of their burrow, and if they only plan for themselves there would seem to be no reason why they should delay the transformation when the time arrives. As a matter of fact, however, they seem to know that the adult must have access to the open air which they themselves have never breathed. Just before pupation they carry their burrow to the surface and smooth the jagged ends of the bark and wood of the opening so that nothing will retard the egress of the moth. They do one thing more which shows a high order of instinct, if it be not reason. The diameter of the opening, just at the surface, is made a trifle less than that of the burrow itself. A little thin ledge projects inward all around the edges of the hole. When the adult is ready to emerge, with the large pupa-case around its body, it arrives at the projecting ledge on the inner side of the opening, and the case itself is a trifle too large to slip through. It is held fast by the ledge while the adult pulls itself out. When the moth has escaped, bits of the end of the pupa-case project outside the burrow, and the empty case may be forcibly extracted before it dries. If this *Cossus* larva pupated in the earth at the foot of the tree there would be a good reason why it should have carried the burrow to the surface. As it does not pupate outside the tree, and as it remains in the open air only long enough to shape and smooth the opening, may we not conclude that here is a worm which cares for its adult?

A CATERPILLAR TRAP.

Wm. Reiff, 366 Arborway, Jamaica Plain, Mass., writes: "A very easy and interesting method to obtain caterpillars of species of *Argynnis* and *Brenthis*, after their hibernation, is the following: Select localities which such caterpillars probably frequent and place on the ground over food plants broad boards of wood, say two feet wide. They must be so far from the ground that they barely touch the food plants, but will touch the grass, etc. Support the boards by means of stones at their ends. In the morning between three and seven o'clock you will find the caterpillars sitting on the under sides of the boards. Quite often you will find besides *Argynnis* and *Brenthis*, caterpillars of *Satyrinæ*, *Agrotis*, *Mamestra*, *Hadena*, *Leucania*, etc.

DESIDERATA.

The following is a sample order for desiderata. I request subscribers to fill it. I have a number of the desired species but am too busy at present to sort my material.

"Enclosed find a list of butterflies and moths which I would like to get for my collection. Please send me your price for as many of them as you have. Walter Stinson, 913 Prairie St., Elkhart, Indiana;"

BUTTERFLIES. *Mechanitis californica*; *Dione vanillæ*, *Euptoieta hegesia*; *Argynnis leto* (female), *calippe*, *laura*, *montivaga*; *Grapta satyrus*; *Vanessa californica*; *Basilarchia weidemeyeri*; *Adelpha californica*; *Neominois ridingsi*; *O-neis iduna*; *Chrysophanus arota*; *Pieris sysimbri*; *Euchloe sara*; *Meganostoma eurydice*; *Parnassius smintheus*; *Papilio rutulus*, *eurymedon*.

MOTHS. *Hyloicus vancouverensis*, *sequoiæ*; *Sphinx cerisyi*; *Hæmorrhagia senta*; *Proserpinus clarkii*; *Celerio intermedia*; *Samia gloveri*; *Saturnia mendocino*; *Pseudohazis eglanterina*, *hera*; *Platyprepia virginalis*; *Apantesis ornata*, *blakei*; *Syneda divergens*; *adumbrata*, *socia*, *howlandi*; *Drasteria cærulea*; *Catocala californica*, *stretchi*, *augusta*, *pura*, *faustina*, *ahobilah*, *verrilliana*.

OBJECTIONS TO USE OF CYANIDE.

E. J. Smith, Sherborn, Mass.

I find this objection to cyanide. With some species of insects cyanide is objectionable because it causes them to rigidly contract the wing muscles so that it is hardly possible to set them. This is particularly true in the case of bees and wasps; their wings can no more be moved than they could be if no joints existed. *Hesperidæ* are also very difficult to spread if killed in this way. Ether will leave them very flexible and is consequently much better on that account. *Ammonia* is also a perfect killer in this respect, but must not be used on any green colors. To use either of the above a little cotton should be wet with the liquid and put in the bottle. A small vial of the liquid should be carried along so as to replenish frequently. Sometimes moths that are too rigid to set when first killed will relax if kept twenty-four hours. In order that they may not dry up they should be enclosed in a tight box with a little moist cotton and some naphthalene to prevent mold. Most beetles die very slowly in cyanide or other fumes, but die instantly if wet with gasoline.

It has just occurred to me that the solid carbonate of ammonia would be easier and better to use, and not be liable to wet the specimens. It would last longer than the liquid. A lump of it could be secured in the bottom of the jar in any convenient way.

ENCOURAGING WORDS.

Geo. P. Engelhardt, Children's Museum The Brooklyn Institute of Arts and Sciences, Bedford Park, Brooklyn, N. Y., says:

"I have read with much interest 'The Butterfly Farmer,' Vol. I, No. 1. It is full of sound and practical advice. What a help such a publication would have been to me when years ago, as a boy, I commenced making entomological collections. 'The Butterfly Farmer' surely ought to be on file in the Children's Museum Library, so that it may be freely consulted by all. I enclose my check for a year's subscription. Please send the publication direct to the Library. I wish 'The Butterfly Farmer' a long and prosperous future."

NAMES OF PURCHASERS.

The following are purchasers of eggs, pupæ or perfect specimens and pay cash for desiderata. They desire price lists. Satisfy yourself of their reliability, make your own contracts and deal with them on your own terms and at your own risk. All subscribers who are purchasers and all who have specimens for sale or exchange may advertise under this heading without charge:

Dr. William Barnes, 152 E. Prairie St., Decatur, Ill.

The Kny-Scheerer Co., 404-10 West 27th St., New York, N. Y.

Ward's Natural Science Establishment, 84-102 College Ave., Rochester, N. Y.

J. G. Duthie, editor "Canadian Thresherman and Farmer," Winnipeg, Canada.

Herman H. Brehme, 74 13th Ave., Newark, N. J.

Pattie Hutchinson, Beeville, Bee County, Texas.

William Reiff, care of Entomological Exchange, 366 Arborway, Jamaica Plain, Mass.

M. Rothke, 1957 Myrtle St., Scranton, Pa.

Fred Breitenbecker, 427 East 144th St., New York, N. Y.

Geo. P. Engelhardt, Children's Museum, The Brooklyn Institute of Arts and Sciences, Bedford Park, Brooklyn, N. Y., wants clippings or sections of food plants containing living pupæ of the Sesiidæ.

H. C. Fall, 191 Raymond Ave., Pasadena, Cal.

Fred S. Lozier, 21 Melrose St., Rochester, N. Y.

Walter Stinson, 913 Prairie St., Elkhart, Ind.

E. Mrs. Ellen Robertson-Miller (author of "Butterfly and Moth Book"), 1416 68th St., Cleveland, Ohio.

Carl J. Drake, Ohio State University, Columbus, Ohio, Department of Zoology and Entomology. Hemiptera. Water-striders wanted for cash or exchange.

F. E. S. Bentall, The Towers, Heybridge, Essex, England.

NAMES OF SELLERS.

Foster H. Benjamin, 118 McDonough St., Brooklyn, N. Y.

Pattie Hutchinson, Beeville, Bee County, Texas.

Jesse F. Lund, 1269 Prospect Place, Brooklyn, N. Y.

Lulu Berry, Vinton, Iowa. (Catocala eggs a specialty.)

John F. Weigand, 1002 6th Ave. S., Wausau, Wis.

Jessie S. Bramlett, Box 229, Oxford, Miss.

T. Nesmith Brown, 71 Highland Ave., Uniontown, Pa.

Mrs. E. Coates, 316 Boyd Ave., Winnipeg, Canada.

EXCHANGE LIST.

Will Rensselaer J. Smith, M. D., Milpitas, Santa Clara Co., Cal., Coleoptera. name specimens.

Fred S. Lozier, 21 Melrose St., Rochester, N. Y.

Mrs. Alphonse Bel, 35 Oakland Terrace, Hartford, Conn.

Robert James Sim, Jefferson, Ohio. Coleoptera.

WANTED.

Transactions of the California Academy of Sciences, 1901, No. VIII. Anyone having that volume for sale will please communicate with Rensselaer J. Smith, M. D., Milpitas, Santa Clara County, California.

List of the Coleoptera of America, North of Mexico, by Samuel Henshaw (new or second-hand). Ximena McGlashan.

THE GUIDE TO NATURE.

Edward F. Bigelow, Managing Editor.

Published by the Agassiz Association, Arcadia, Sound Beach, Conn. A profusely illustrated monthly magazine for adults, devoted to commonplace nature with uncommon interest. Subscription \$1 per year. Single or sample copy 10 cents.

GOODS FOR ENTOMOLOGISTS.

A. Smith & Sons, 71 Cortlandt St., New York, N. Y., Manufacturers and Importers of Goods for Entomologists, Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added. Send for list.

A SIMPLE HEIGHT ADJUSTER.

In connection with the device for mounting insects at one height. This is very easily managed by taking a little piece of hardwood, say one-quarter inch thick, boring a little hole in it from one side to the other, and then you can have it on your mounting table ready for use. I have a little device of that kind, and not only is it cheaper than the device sold by entomological houses, but is also better, as the broad board does not dent any soft bodied insect that you may push against it. Of course, you can have it of any thickness you want, and as many as you want, to adjust height of insect as well as height of label. It is better to have the insect a little over one-quarter inch from the head of the pin, especially for the small beetles and bugs, on which you have to use high power magnifiers, which must be put only a little less than a half inch from the object, and even nearer for the more distant parts of the body. This, however, is not so applicable to the larger as it is to the microlepidoptera.—J. R. de la Torre Bueno.

PUPAE WANTED.

Miss Edna Mosher, University Y. W. C. A., Champaign, Ill., desires pupæ of *Arctonotus lucidus*, *Saturnia mendocino*, *Coloradia pandora*, *Hemileuca electra*, *nevadensis*, *juno*, *grotei*, *neumogenii*, *hualapai*; *Pseudohazis eglanterina*, *shastaensis*, *hera*; *Hylesia alinda*; *Sissphinx heiligbrodti*; *Lepisesia clarkiae*; *Sphinx perelegans*, *vancouverensis*, *sequoiae*, *dollii*, *coloradas*, *elsa*, *Samia gloveri*.

USEFUL BOOKS.

The following are a few of the books which beginners will find useful:

Moths of the Limberlost. Gene Stratton Porter.

Butterfly and Moth Book. Ellen Robertson-Miller.

Moths and Butterflies. Julia P. Ballard.

Caterpillars and Their Moths. Ida M. Eliot and Caroline G. Soule.

The Butterflies of the Eastern United States. G. H. French.

Entomology for Beginners. A. S. Packard.

Three Kingdoms. A Handbook of the Agassiz Association.

ARTIFICIALLY BRED SPECIMENS.

Geo. D. Hulst wrote: "Some collectors assert that artificially bred specimens never attain the full size and luster of specimens bred by nature. But they are without doubt in error. It is true that the greater number of bred specimens lack in size and luster. But that is accounted for by the fact that nature never fails to furnish fresh food and plenty of it to her wards, while it is very rarely that a brood of insects is reared by man without being more than once stinted in food or having it in a wilted condition. It is certain that with proper care not only can nature be equaled, but in very many cases surpassed. For nature presents many things unfavorable to the full development of insect life. Art may give only what is best; this requires care and experience beyond what the most have time or opportunity to give."

CORRESPONDENCE COURSE IN ENTOMOLOGY.

Conducted Under the Auspices of The Agassiz Association.

Lesson IV. THE PUPA.

WHAT A STRANGE THING IS A CHRYSALIS.

In the magnificent works of Dr. Sam'l H. Scudder entitled "The Butterflies of New England," works which represent stupendous labor and genius, the illustrations of the various chrysalides are singularly fascinating. What queer shapes, what curious designs, what exquisite colorings! What a wonderful stage in the incarnation of a butterfly is the pupa! How utterly inconceivable that beneath the skin of a caterpillar is concealed a chrysalis, and enclosed in the pupa is an imago! The worm stage represents the humblest and most generally despised form of animate life, the butterfly the most glorious, exalted, enchanting and resplendent form. Between the two is this strange, mysterious, pupal link in which animation seems almost suspended. All the senses except that of feeling are obliterated, and a slight wriggling motion when disturbed is the only indication of feeling. Sight, taste, smell, hearing have perished. The caterpillar has died. The larvæ of many moths bury themselves in the ground and utterly disappear, leaving behind something vastly different from a larva and wholly unlike a moth or butterfly. Life, death, burial, resurrection are so strongly typified and emphasized, in the transformations of insects that it is little wonder these transformations are recognized as mute and eloquent sermons on immortality.

FROM WORM TO CHRYSALIS.

Watching for the first time the change from caterpillar to pupa inspires strange thoughts. Perhaps you saw that caterpillar as it hatched from the egg and have nursed, fed and cared for it every day of its life. You have learned to really like it. You have given it the freshest of leaves, worried when it failed to eat, rejoiced over its change of raiment after each molting period, and have anxiously observed its restlessness and evident unhappiness as the pupal stage approached. You have seen it shrivel up and lie so still that you felt it must be dead. Suddenly the shrivelled skin splits at the head and thorax and the wriggling chrysalis is disclosed. The head, legs and all that seemed to constitute the caterpillar is crumpled up into a pitiful little pile of wreckage. The thing you cared for so tenderly was only a mask. The true ego, the inner self, the only part that survives is the chrysalis, and plainly marked on its moist, soft covering are the head, legs and folded wings of a butterfly.

WHEN TO FIND PUPAE.

Fall and Winter are the best seasons to search for cocoons because the leaves are gone, the twigs and branches are bare, and one is more likely to find them. Some moths and butterflies hibernate and these can be occasionally captured; some species pass the winter season in egg and larval state; but the best of the winter collecting is gathering cocoons. Until you have mastered the trick of searching for them you will think the task impossible, but after a little practice and experience you will wonder how you lived so many years without discovering these queer little objects. As soon as the Autumn leaves flutter to earth the work begins and it continues until the Spring verdure conceals their hiding places. It

is interesting and frequently exciting work and is very profitable. One correspondent reports finding four hundred in a single day and another one thousand. A good collector will usually discover as many cocoons in a winter day as he could capture of perfect specimens on a summer day.

WHAT TO LOOK FOR.

Possibly you could not find a bird's nest if you had never seen one, and if you do not know what a cocoon looks like your quest may be discouraging. For five cents, to cover cost of sending, I will mail samples of empty pupa-cases which will give you an idea of what to look for. You may not find the same specimens but you will discover something like them. For five cents each I will send as many samples of live pupæ as you wish, and each should produce a perfect cabinet specimen next spring. There are many different forms. You must take everything you find, which resembles a cocoon. Those of the silk moths are the easiest to find because of their size, but a little practice will enable you to search successfully for other forms. There are hundreds to be found in each locality, and care and diligence, close observation and persistent hunting are sure to be rewarded. One is certain to find rare and valuable forms which will produce species of butterflies and moths which could not be obtained by net, sugaring, traps or any other known method of collecting.

WHERE TO LOOK FOR COCOONS.

You will find cocoons spun to the stems, limbs and twigs of low bushes, especially of varieties which have thickly clustering branches like the gooseberry, alder, wild cherry, chapparal, manzanita, sage-brush, etc. In walking through an orchard, you will find them upon plum, apple, pear and all varieties of fruit trees. They may be suspended from a branch, attached to a twig, half hidden in crevices of bark, or concealed in what appears to be a bunch of leaves still clinging to the branches. They are on oak, elm, maple and almost every forest tree. By the bank of a river or pond the bushes and trees abound with them. Every thicket and bramble patch, every cluster of bushes or vines may contain them. They are on the loose leaves under trees, many pupæ dropping to the ground and lying all winter beneath the leaves and rubbish. They are frequently on fences, walls, in the area of basement windows, in the nooks and crannies of porches, barns, chicken coops, out-buildings and under roofs, bridges, floors and trunks of fallen trees, beneath loose bark, in rotten wood and logs, in old stumps, under chips, boards, stones, sticks and rubbish. Parks abound in them. They can be dug up in the loose soil of yards, gardens, flower beds, under bushes and trees, in potato, tomato and cabbage patches, and are often brought to light by the spring plowing.

SAVE ALL PARASITES.

Some of the cocoons you gather will be parasited. Every government, state and county in the civilized world is spending money lavishly endeavoring to control insect pests, and every entomologist, student and lover of nature should assist in this work. Save every enemy, parasitic or otherwise, that destroys egg, larva, pupa or adult. You may discover something that will be of untold value to humanity. Save every insect that destroys lepidoptera and send it to me or to some insectary. The beginner in butterfly farming may become a public benefactor if he will carefully observe and preserve the enemies which destroy his charges in the cocoon or

other stages. Work hand in hand with the insectaries and scientists. It is true they are destroying and in time will utterly exterminate entire families of butterflies and moths, it is true that nearly all cocoons found in the vicinity of insectaries will be worthless because of enemies which have been bred and liberated by these institutions, but your highest duty is to assist in this work. I hold that the butterfly farmer can be of incalculable service to agriculture, horticulture and viticulture. It is very disappointing to find that cocoons which you have gathered are worthless because of parasitic flies, but if it chance that you discover a new parasite you may score a victory by giving to science a remedy that may save the crops of an entire state from devastation. Never breed and liberate species which can become pests. Most species of moths and butterflies are known to be harmless, and none others should be allowed to escape from your breeding cages. When you lose a batch of eggs, a brood of larvæ, or a lot of cocoons, try and discover the cause. The cause of your loss may reveal a secret for which scientists are vainly searching, a secret which may ward off poverty, ruin and even famine from prosperous regions.

HOW TO TELL LIVE PUPAE.

Cocoons which are naked will usually squirm and wriggle if held gently in the warm hand for a few moments. If dead, they will be hard and brittle and light. The usual test for a cocoon covered with a silken web or covering is to invert it suddenly close to the ear. Don't shake it for that may cause injury and a quick turn of the wrist is sufficient. If sound and healthy there generally will be a distinct, solid, rather heavy thud, as the pupa drops from one end of its hollow enclosure to the other. If parasites are present there will be a rattling sound as if the interior contained small shot. When the pupa is dead it will be of light weight and there will be no sound at all. Sometimes these tests fail and I have cut open cocoons which were healthy but which gave no response when inverted. The appearance and flexibility of naked cocoons indicate their condition. Empty pupa-cases should not be destroyed. Label and preserve them to illustrate life-histories.

MULTITUDES OF ENEMIES.

Some Ichneumon flies deposit their eggs in larvæ to develop after the pupa has formed, and other deposit their eggs in the chrysalis itself. Test your pupæ frequently and separate those which seem infested. When you discover flies of any size, even though they be very small, among your cocoons, capture them at once. You must constantly guard your cocoons against mice, ants, beetles and spiders. Unless the earth and sand in the breeding cages was baked an army of microscopic enemies may threaten the pupæ. Filth, mold, fungus and the decomposition of larvæ which died while endeavoring to transform to pupæ, cause disease and death to riot among stores of cocoons. Artificially heated rooms parch the life out of pupæ, freezing kills them, shaking or dropping them breaks the chitine or outer covering, and any unnecessary handling or rough usage may prove fatal. In nature "countless horrors lurk unseen" about the pupal stage. Birds, bats, snakes, squirrels, roaches, vermin and other enemies devour them by the thousands. Toads have such greedy, insatiable appetites for every form and stage of insect life that I cannot understand why they are not propagated in ponds and swampy places for the purpose of being transported to districts which are threatened by grasshoppers, army worms or other pests.

METHOD OF PUPATION.

There is no trouble in telling when larvæ are about to pupate. They stop eating for a day or two, empty their intestines, shrink and diminish in size and perhaps grow limp and apparently lifeless. Some are exceedingly restless and crawl excitedly about their cages. If at liberty they may be found crawling in roads or over bare ground. The butterfly larvæ may spin buttons of silk under the top or on the sides of their cage, insert their anal hooks in these and hang suspended, head downward. Under the covers of tin boxes or glass-covered boxes, should be placed a thickness of scrim, netting or mosquito bar to which such caterpillars may attach themselves. Sticks or branches should be provided to which the silk-spinners may attach their cocoons. When larvæ disappear in the earth at the bottom of the cage do not dig them up to see what they are doing. Curb your curiosity and let them alone. Let all pupæ alone for a few days in order that their covering (chitine) may harden. In all probability those which burrow in the earth will form tubular, oval or circular holes and cement or gum the interior so as to form a smooth lining within which the pupa may safely and snugly rest. A silken envelope may separate the pupa from the inner surface of the earthen hole. Sometimes a ball of earth as large as a bowl is formed about the pupa. If cages are not provided with earth these larvæ will pupate upon the bottom of a tin box or glass jar. This is unnatural and unsatisfactory but when the time arrives they must undergo the transformation.

PUPAL CAGES.

Theoretically it would be better to leave pupæ in the earth where the larvæ burrow, or on the tops and sides of the cages where they are formed. Many weak larvæ, however, die during the transformation and their decay breeds disease. Moreover, it is difficult to afford pupæ in breeding cages, and especially in boxes, cages and glass jars, the proper moisture required. If kept too dry or too wet they surely perish, and over-crowding breeds disease. The better plan is to keep them in specially prepared pupal cages whose sides are protected by fine wire gauze to keep out enemies. A framework surrounded by cheese-cloth and containing trays arranged like shelves, may be suspended by wires covered with tangle foot, forms a convenient cage, and will accommodate large numbers of cocoons. Of course, if you have only a few cocoons you may keep them safely in tin or wooden boxes, but if you have hundreds or thousands cages should be provided.

CARE OF COCOONS.

Safety, light, ventilation, a cool place, occasional spraying with an atomizer, cleanliness, care, the least possible handling or disturbance, are the main requisites for keeping cocoons. Earth, sand, sawdust, a folded blanket, or best of all, sphagnum (the moss used by florists), should cover the bottom of trays or boxes and form a soft bed upon which the cocoons should be laid. As far as possible lay them with their backs up. On the underside of naked pupæ are the outlines of legs, wings, etc., and the tongue cases of certain species. A slight covering of loose sphagnum should be laid over them to retain moisture. Do not cover them with sand or earth, or expose them to sunshine, rain or freezing temperatures. A garret, a ventilated cellar or basement, or any room which is not heated should be selected for the cages. If you fail to spray or sprinkle them with water occasionally their cases and tissues will dry up. If you keep them too wet you invite fungoid diseases.

CHRYSLIDES OF BUTTERFLIES.

In the above statements the hibernating cocoons have been generally kept in mind, as they require greatest care. The larva of a butterfly may safely be allowed to form its chrysalis on the top or side of the breeding cage, if netting or cheese-cloth lines the interior walls, and may be left in position during the short period of pupation. Larvæ should not be permitted to crawl over or molest newly formed chrysalides, as their tender coverings may be injured. All pupæ may be safely removed if desired. Buttons of silk to which they are attached may be gently disengaged by the point of a pin or needle. Little chips may be cut out of the sides of boxes at the point where the chrysalis is attached. Chrysalides do not require spraying as a rule. The silk fastenings of spun cocoons may be cut from the sides of a glass jar with a knife blade, and such cocoons may be removed from wood, tin or twigs by gently severing the fastenings. No pupa should be disturbed, however, until its outer casing has hardened.

HATCHING. SEX DISTINCTIONS.

Do not cut open silken cocoons. It may not kill or injure the pupa to do so but it frequently does. When the pupa is ready to hatch be sure that it is not so covered up that the adult cannot escape, and see that there is something handy for the newly hatched feet to climb up and cling to while the wings expand. A cloth-lined box or one whose sides and top are rough afford good clinging places. Do not attempt to assist the adult in getting out of the pupa-case. Some authors think the larger, heavier pupæ yield females, because the body of the female moth or butterfly is larger than that of the male, but the rule has many exceptions. You will find it an interesting experiment to try and sort your cocoons so that the males and females will be in different hatching boxes when they emerge. You will find it is largely guess work. Sex distinctions in larval and pupal stages undoubtedly exist, but no inflexible rule has been published by which the male can be told from the female caterpillar or cocoon. Note the time of day at which your various species of pupæ hatch. Some varieties can be fairly depended upon to emerge during certain hours. Each pupil should have a considerable number of hibernating cocoons during the winter in order to acquire the knowledge of caring for them which comes from experience.

SELLING SETS OF COCOONS.

Long established customs are not easily changed, and the practice of those having collections has been to pay extravagant prices for a few cocoons or adults, rather than purchase at a low price a set of those from a particular locality. The collector must charge high prices for a few because he cannot dispose of the remainder of his output. It may be that this rule is so firmly grounded in custom that it cannot be altered but it is an absurd rule. Gene Stratton Porter in "A Girl of the Limberlost" suggested a better method when she stated that her heroine was offered \$300 for a complete set of the moths of the Limberlost. Dr. William Barnes paid me five cents apiece for the butterflies and moths of Truckee, each species being limited to 100 specimens. This enabled me to breed and collect everything I found. He received at least a few species that were new to science and many that were quite rare, and the value of these doubtless compensated him for varieties which were comparatively worthless. All dealers write me for price lists and I am working hard to formulate reasonable lists for sets of the Lepidoptera of the Sierra Nevada Mountains. Some specimens are well worth \$5, for they

cannot be found in the largest collections. Several will sell for \$1 apiece. The vast majority of species are worth one cent or even less. Is it possible to group the rare and common varieties at five cents as a flat rate and so get rid of the common species? It would take a year's output, or the outputs of several years, perhaps, to prepare perfect sets. Meantime, with the help of my correspondents, sets of Pacific Coast specimens could be offered, and possibly of almost all American specimens. There is no money to be made in selling singles except at high prices. What I am saying will apply to each locality. My advice is to raise and gather every species and offer the lot at a low figure. When you know the valuable varieties breed them in quantities, but unless you gain experience by breeding common sorts your attempts to breed the valuable kinds will result in failure.

FAILURES IN SILKWORM INDUSTRY.

The rearing of silkworm cocoons is destined to give profitable employment to hundreds of thousands of American women. The industry dates from 1734 when Governor Oglethorpe took eight pounds of silk from Georgia to England. Congress and several of the state legislatures have made large appropriations at different times to disseminate information and foster the industry. Societies and clubs of women have labored to instruct beginners. At times seri-culture has been a craze. Send fifty cents to Mrs. M. C. Reton, Mission Cliff Curio Shop, 4668 Park Boulevard, San Diego, Cal., for "Rearing Silkworms," by Carrie Williams, and you will learn how the work is carried on in large establishments. The instructions regarding the care of larvæ are very complete. Indeed, there is a library of books on this subject accessible to the enquirer and no one need lack instructions. I boldly assert that the principal reason why failures have been made in the past is the lack of experience in the business of rearing larvæ. I constantly urge my pupils to rear all kinds of larvæ, even the commonest species. If the financial returns are small the knowledge which can only be gained by experience justifies the labor. If you are a beginner do not confine your efforts to raising rare and valuable species else you will surely meet with discouragement. When you have had practice and experience in caring for common varieties of caterpillars you will be able to profitably rear silkworms and other varieties that will insure an income. No directions, however explicit, will enable the beginner to succeed with every brood of larvæ. Experience and nothing else will qualify you for butterfly farming on a profitable scale, and the same may be said of seri-culture. History proves that most of the people who attempted to learn silk-culture, many of whom invested every dollar they possessed in mulberry trees, failed because they knew nothing of rearing larvæ except what they read in books. Butterfly farmers will not fail. The market for the output of silk farms is always active, and the business can be carried on wherever the mulberry will grow. In many parts of Europe a good portion of the family income is derived from the production of silkworm cocoons. It does not require capital, nor costly paraphernalia to obtain profitable results.

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AMATEUR ENTOMOLOGISTS



XIMENA McGLASHAN

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THE EDITOR AND ASSOCIATE EDITOR.

HUNTING EGGS OF LEPIDOPTERS.

R. R. Rowley, Superintendent of Schools, Louisiana, Mo.

The study of butterflies and moths with most of us is a pleasant diversion, a rather harmless way of occupying our leisure summer hours, but, it is true, it becomes so fascinating that we are soon driven to pursue it after the manner of a business, accepting from nature imagoes and larvæ as dollars and cents in payment of strenuous toil.

Like a hunter in pursuit of game, we go armed in quest of winged creatures, first with a net and poison jar, but the capture of beautiful butterflies can not always quite satisfy us. We want to know more of the lives and habits of the lepidopterous denizens of the woods and fields, so we add to our hunting paraphernalia, tin boxes and paper bags.

Professor Gerould and others have told us how to obtain the eggs of butterflies by imprisoning the females with sprays of their foodplants, but I am going to tell you how to search for them out in the woods.

As plentiful as *Papilio ajax* is here, it was a long time before I could secure an absolutely perfect imago and I hadn't found the grown larvæ plentiful either in June or September; but one day as I strolled along the edge of a thicket I noticed an *Ajax* flitting just above the ground and ever and anon poising for an instant over a leaf. As she zigzagged through the weeds and low shrubs I followed her with my eye and marked her stopping or halting places. Upon investigating I found her eggs on the tender end leaves of low papaw sprouts, in most cases less than a foot above the surface of the ground. I found a score of eggs in a few minutes search and quite as many freshly hatched larvæ. Other *Ajaxes* had flitted through the same little shrubs days before I saw the one ovipositing. That was in early June. Later in the same month I had nearly two hundred larvæ feeding.

Since then I have had no trouble finding eggs and larvæ of *Ajax*. Of course the eggs were laid on the top side of the leaf, as a rule, and are round and pale green without any flowery covering powder. To trained eyes the eggs of *Ajax* can be seen as you walk along near the papaw plants.

I had the same difficulty with both *Papilio cressphontes* and *turnus*, but when I discovered the eggs of the former on the low tender leaves of stunted and grubbed hop-tree sprouts, I solved the problem, and while collecting the ova of *Cressphontes*, I found quite as many green as egg-yolk-colored ones, and later found to my surprise that I had both *Cressphontes* and *Turnus* on the same foodplant. I still find the eggs and larvæ of both of these species on the same plants, and not uncommonly.

For years I had sought the foodplant of *Papilio philenor*, but never a pipe-vine could I find in the woods. Just as in the case of the female *Ajax* I followed an ovipositing *Philenor* and found the slender low herb *Aristolochia serpentaria*, a plant so insignificant that I had overlooked it. The egg as in *Turnus*, *Ajax* or *Cressphontes* is round and on the top side of the leaf, colored much as that of the latter species with the dusting or pruinescence a little deeper orange.

It is no trouble here in Missouri to find the eggs and larvæ of *Papilio troilus* on the grubbed sprouts of sassafras. Quite as easy a task is the locating of eggs and larvæ of *Papilio asterias* on wild or escaped parsnip or garden celery.

The eggs of *Colias* and *Pieris*, although slender-spindle-shaped, can be readily located on their foodplants. I have found the eggs of *Colias* everywhere plentiful on the small plants of sweet clover and have often collected dozens of eggs of *Meganostoma cæsonia* on its foodplant, *Armorpha fruticosa*, not on the old shrubs, but the low young plants.

Similarly I have found the eggs of *Terias lisa* and *Callidryas eubule* on the top side of the leaflets of *Cassia chamæcrista*, those of *Terias nicippe* on *Cassia marilandica*, and those of *Nathalis iole* on wild marigold.

I have seen *Basilarchia astyanax* ovipositing on apples and *B. disippus* on willow, and time and again, *Euptoieta claudia* on violets.

It is little trouble in August here to collect scores of eggs of *Amaea andria* on the leaves of goat weed, *Croton capitatum* and *C. monanthogynum*, and quite as plentiful are the ova of *Grapta interrogationis* on elm sprouts. The *Nymphalidæ* either lay their eggs at the tip of the leaf or at the edge or underside as is the case with *A. andria*.

In searching for the eggs of *Papilio ajax*, I often found on the underside of the papaw leaves a larger spherical green egg, that of the hawk, *Dolba hylæus*.

The first imago of *Smerinthus geminatus* I ever saw was resting at the base of a small aspen tree and in ten minutes afterward I had taken more than a dozen of eggs of that species from the little sprouts growing near.

Often have I found the eggs of *Pachysphinx modesta* on the under side of cottonwood and aspen leaves, those of *Smerinthus excæcatus* on apple and plum.

The under side of the loose bark of hickory, willow, oak, plum, apple and walnut is a perfect storehouse of *Catocala* eggs, and furnishes much interesting collecting throughout the autumn and winter.

In summing up, look for the eggs of butterflies on the tender end leaves of young plants or sprouts, for the *Papilionidæ* on the top side of the leaf and for the *Nymphalidæ* at the end or under side for ova of *Sphinx* moths on the under side of the leaves of their plants. The larger silk moths often lay on the body of the tree or bush as well as on the under side of the leaf. The *Catocala* oviposit in the groves of or underneath the loose bark of their food trees.

Knowing the foodplant and the time of appearance of the imago, the collector has little trouble securing eggs and larvæ, but having no knowledge of the life history of a species, save an acquaintance with the adult, he must find means of learning more of its habits and developmental stages.

In the bright sunshine of summer the female butterflies are busy ovipositing and the collector on the alert can hardly fail to locate the foodplants and the deposited ova.

A lone butterfly flitting leisurely and apparently aimlessly along should be observed closely for a few minutes. If she drops to a leaf for a second and then is off again as if searching for something lost, the collector is on a "warm trail." If close enough the observer will see the insect on alighting quickly curve the end of the abdomen down against the leaf and the egg is placed. I have seen *Ajax* occasionally place an egg on a dead twig or leaf of some plant other than papaw, but very near to its foodplant.

It is not uncommon to find single eggs of *Catocala ilia* under the bark of shag-bark hickory half a mile from bur oak, its foodplant. The moth

either mistakes the tree in the latter case, or is forced of necessity to deposit regardless of consequences.

The search for the eggs of lepidoptera is quite as interesting as the collection of larvæ, pupæ and imagoes.

STICK AND LEAF INSECTS.

"These belong to the order Orthoptera and family Phasmidæ. In the Transactions of the Manchester Entomological Society of 1912 I find:

"The Phylliums, or leaf-insects, are peculiar to the Old World, being mostly confined to the islands in the tropical zone. Several species inhabit the Seychelles and Ceylon, whilst others occur in Mauritius, Borneo, Java, Celebes and the Philippines, and they would seem to have a special predilection for insular life."

I have not yet ascertained whether the various genera of stick insects are also restricted to the Old World. However, in any event, you have correspondents in some of the countries above enumerated. Hartwig's "Tropical World" refers to a stick insect occurring in Tasmania that attains a length of eight inches, but does not give the scientific name of the species. I am particularly desirous to secure some ova of this Tasmanian insect. Henry Donaldson, Care 1 Queen St., Lincs, Brigg, England.

ENTOMOLOGY FOR AMATEURS.

J. M. Aldrich of the United States Department of Agriculture, Bureau of Entomology, 238 S. Grant St., LaFayette, Ind., writes: Your enterprise interests me greatly. I am glad to see entomology taken up in an amateur way for the beauty and interest of it. There is unlimited room in this country for such work, and need of it. That you have succeeded in so short a time in arousing, I may almost say, the whole country, shows that there is also a demand when the subject is presented in a way that makes the right appeal. It is astonishing to me that so young a person should have been the one to get just the right start. I congratulate you sincerely."

LARVAL AND PUPAL DIFFICULTIES.

E. A. Cutler, 1677 Lenox Ave., Los Angeles, Cal., writes: "I received the copy of the Butterfly Farmer; enclosed find P. O. for \$5.00 for subscription for it. I think any one will find something in it that will be of use to them, if interested in entomology. The most trouble I have had in this climate rearing larvæ is I think entirely due to the climate at Los Angeles. I have found if I use the open cages or trays, that the foodplant does not keep fresh for any length of time, and you have to have large quantities of it within easy reach, and if raised in glasses, during the night they are liable to collect so much moisture that a great many are killed by drowning. This is a funny climate down here, different from the East and also, I imagine, different from Truckee. I have had some cases where the moths or butterflies emerged, that the air seemed so dry that their wings seemed to harden before they were fully developed and they were cripples, or the wings seemed shriveled up on the outer edges. The above condition can probably be overcome with more experience, still if you could give me any suggestions on the above, I should be very much pleased to have you. Also could you give me the address of

some good dealer in entomological supplies, such as pins, etc. I suppose later I can get living pupæ from you if I wish any. If you have a list a little later, I wish you would send it to me."

The climate of Truckee is exceedingly dry. The humidity is about the same as that of the driest portions of Arizona. My experience, therefore, suggests no remedy, but I dare say that rearing larvæ in cages containing the living foodplant would afford the simplest solution of the difficulty, even though it entails some expense and trouble. Pupæ being too dry is a common difficulty here, but I would not expect it in the moist atmosphere of Los Angeles. I am compelled to spray all pupæ, occasionally, with an atomizer, or to spray the sphagnum in which the pupæ are kept. Lists of Truckee Lepidoptera will appear at an early date.

A LARGE CLASS.

L. Margarett Pettibone, a teacher in the Albion High School, Michigan, has organized a class of sixty pupils. Can any one beat it? She writes:

"I received and was very much pleased with the lesson on butterfly and moth farming. We have organized a class and wish to take the twelve lessons. We have a class of sixty young people and all seem exceedingly interested. Enclosed find money order for five dollars."

TAKING INSECTS FROM NET.

E. J. Smith of Sherborn, Mass., writes: "In your directions for taking insects out of a net you say put the jar inside the net and get the insect into it. A much easier way (and also much safer in case of a big bumble bee) is to get the insect into a hole of the net push that hole into the jar and hold it there until the insect is stupefied and then transfer to the jar. 'Skippers' are much quicker subdued in this way. All nets should be as transparent as possible so that you can see instantly where the insect is and what it is doing. If you don't believe it just try to hunt for a wasp in an opaque net. You will find her all right, but she will find you first.

HERMAN H. BREHME.

Dealer in INSECTS OF ALL ORDERS and ENTOMOLOGICAL SUPPLIES, Insect Pins, Cork, Riker Specimen Mounts, Lepidoptera Cocoons and Pupæ; 74 Thirteenth Avenue, Newark, N. J.

THREE-CENT COCOONS.

I can purchase, in lots of 500 to 5000, live cocoons of four large, beautiful silk-moths, f. o. b. at point of shipment, to wit:

SAMIA CECROPIA LINN.

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I can retail these in lots of 60, postage prepaid, for \$2.00. Orders filled promptly so long as supply lasts. Money returned if supply is exhausted. No profit can be made by handling this business, but I desire to give my subscribers the opportunity of watching these magnificent moths emerge from pupæ, obtain perfect specimens and mate them. Orders for a less number of cocoons than 60 will be filled at 5 cents each, postage prepaid.

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The following are purchasers of eggs, pupæ or perfect specimens and pay cash for desiderata. They desire price lists. Satisfy yourself of their reliability, make your own contracts and deal with them on your own terms and at your own risk. All subscribers who are purchasers and all who have specimens for sale or exchange may advertise under this heading without charge:

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J. G. Duthie, editor "Canadian Thresherman and Farmer," Winnipeg, Canada.

Herman H. Brehme, 74 13th Ave., Newark, N. J.

Pattie Hutchinson, Beeville, Bee County, Texas.

William Reiff, care of Entomological Exchange, 366 Arborway, Jamaica Plain, Mass.

M. Rothke, 1957 Myrtle St., Scranton, Pa.

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Lesson V.—THE ADULT.

"OF WHAT USE ARE BUTTERFLIES?"

That question is asked oftener by beginners than any other. It is a proper, natural question for one to ask who learns, for the first time, that butterflies can be sold. Everything that brings in money must be useful, or in some manner must contribute to the welfare or happiness of mankind. And yet, at the outset, this question used to jar upon my nerves. To one of my first correspondents, No. 33, I believe, who had politely asked, probably from sheer curiosity, "What commercial purposes are butterflies used for?" I exploded as follows: "None, I think. It is said that the Chinese make medicine out of certain varieties, but I really do not believe it. Science generally claims to ignore commercialism. If you asked the Astronomer of what commercial use are the stars, he would blink at you in astonishment. Of what commercial use are the 'lilies' or what does it matter commercially 'how they grow?' yet we are told to 'consider' them. John Muir, at a public meeting given in his honor at Portland, was asked if he saw gold in the streams of Alaska. This was long before gold was discovered and the man thought he was asking a good, practical question. Muir's reply was: 'I don't remember to have noticed. If there had been a lump of gold where I was drinking I would have admired it no more and no less than I would any other pebble.' Of what use commercially are the paintings of the great masters? or the Aurora Borealis? or the music of the spheres? Anything so beautiful as a butterfly's plumage, or a beautiful note in music, or the rainbow in a mountain cascade, or a spray of maidenhair fern or the sunset glow on Mount Rose does not need a commercial value. Butterflies are not used for commercial purposes; they are studied for scientific purposes; they are studied because they are the most marvelously beautiful of God's creatures." I felt better after I had thus exploded, but when correspondent after correspondent asked the same question, I thought better of the matter and apologized to No. 33.

PROVIDE PERCHES FOR NEWLY HATCHED ADULTS.

When the queer little adult emerges from the pupa, with its wings folded and crumpled together, its big head and soft, moist body, it has slight semblance of a butterfly. Its first necessity is to reach some twig, the under side of a piece of bark, a stick or a board to which it can cling and allow its wings to hang down and expand. The pupa, when the time for hatching approaches, must be placed near the side of the cage, or provided with a loose covering of twigs, branches, or something upon which it may climb and hang suspended, back downward. Cages with cloth sides and top, made of wire netting, of rough, unplanned boards, or of coarse pasteboard, afford safe and satisfactory surfaces for the feet to cling, but the newly hatched butterfly should not be compelled to travel far to reach its perching place. The grass and weeds and bushes under natural conditions offer abundant resting places, and in artificial surroundings careful provision must be made. Unless great care is taken in this respect the wings will not properly develop and the insect will be crippled and ruined.

THE BUTTERFLY'S DEVELOPMENT.

Give the wings ample time to dry after they have expanded. Some species demand only half an hour, under favorable conditions, but many require three or four hours. Not only must the wings unfold, but the blood must circulate and the various organs of the body be prepared for the functions of life. Few incidents of this fascinating business are of such absorbing interest as the emergence of the butterfly from chrysalis and the development of the adult. The unfolding of the wings is frequently exhibited in the film of a moving picture show and is always popular, but to behold the actual process is more interesting than the representation. Every pupil should be provided with a number of pupæ in the Spring in order to experience the joy of watching the wondrously beautiful colorings as the wings expand, and to note the stages of development in the newly hatched moth or butterfly.

"HOW CAN I TELL A PERFECT SPECIMEN?"

This question is frequently asked. The best answer, though perhaps not the most satisfactory, is to compare the specimen with one which has emerged from pupa and is just ready for its first flight. At this moment the legs, antennæ, body and wings are perfect. The scales are all in place, and the delicate tints and lines are at their brightest. The collector frequently finds insects which have hatched that very day and so is often enabled to capture cabinet specimens, but unless he is thus fortunate the brilliant colorings are apt to have faded, and the bloom will have vanished. The butterfly farmer runs no risk whatever. When the creature is ready to fly, when it is absolutely perfect, it is transferred to the cyanide bottle or a few drops of ether, chloroform or gasoline is applied to its thorax and body. There is no excuse whatever for placing an imperfect specimen in a paper envelope, or pinning it in a box, if the specimen has been bred.

MATE IMPERFECT SPECIMENS.

Not all insects are perfect, however, when they emerge from cocoons. Some accident, some rough handling or sudden jar, or some defect occasioned by improper care of the pupæ, will produce crippled or deformed insects. If the proper degree of moisture has not been provided during the pupal stage, imperfections result. The wings will never expand properly. Such specimens should be transferred to the mating cage in the hope of securing eggs. The progeny of a crippled moth will be as perfect as though the mother-moth were not deformed. Physical defects are not transmitted. Males with imperfect wings will frequently mate as readily as others. The mating cage may be as large as a room, or as small as a pasteboard shoe-box, according to the specimens mated. Always endeavor to place more males than females in the mating cage. Supply food to such species as have mouth organs.

CAGED FEMALE AS LURE.

In the four sides of a paper box, six or eight inches square, cut openings say three by four inches, and paste mosquito bar or netting over the openings. Put a freshly hatched female moth in this box and set it on the sill of an open window, or in the open air, and dozens of males may be attracted. With

certain species, as *Pseudohazis eglanterina*, the males will come in swarms. If you hold the box the moths will settle all over it, and on your hands, arms, head and on your dress. If the windows are open at night your mating cages will attract many males. This applies to *Cecropia* and the largest moths, as well as to the smaller varieties, and great numbers of males may be captured with a net as they hover about the cages. Some varieties will mate almost as soon as they emerge from the cocoon, and others may not do so for many hours. When a considerable number of cocoons hatch there are always enough imperfect adults to supply large quantities of ova for next season's crop.

"WHAT KINDS ARE COMMON?"

This is a query that is often asked, and in the best of faith. If the wants of purchasers is to be the test, consult the price-lists of dealers. The cheapest are the commonest. Holland's books frequently mention that a species is rare or common. Some varieties are found in almost every part of the world, as *Pyrameis cardui* (the Painted Lady), and the larvæ of some are a pest, as *Pieris rapæ* (the Cabbage butterfly). It is a fact, however, that some one, somewhere, wants everything that flies. Each collection is incomplete without perfect samples of the commonest species. No two entomologists or dealers will give you exactly the same answer as to what are "common," as a certain species may be very abundant in some localities and extremely rare in others. The only safe rule is to secure a large number of specimens of every moth and butterfly which flies in your locality. *Anosia plexippus* (the Milk-weed butterfly), can be bred from larvæ by the thousands, in some localities, but it is quite rare in Truckee, and I have received many orders which I could not fill. For art work the yellow, blue, red and white and all bright-hued varieties are in demand regardless of how common they may be.

COMMON MOTHS.

The army worm, gypsy moth, tent caterpillar and other well known pests are unquestionably common, yet they are well worth studying, and it is little trouble to gather and feed a few hundred larvæ. Make yourself familiar with each species of butterfly and moth which is found in your locality. A long list of common moths could be named, if the selling price is to be the criterion, but if you want to understand your business raise everything until you have a large number of perfect specimens. I have little patience with a pupil who passes by a moth, butterfly or caterpillar simply because it is plentiful, and easily obtained. When you prepare lists of the material you can furnish, the common varieties may be mixed with the rare, and so lower the aggregate price as to sell the entire lot. To me, a "common" insect is the one of which I have hundreds of perfect specimens, and which I know to be comparatively valueless. In learning to spread and mount lepidoptera do your practice work with common species. In making pictures or art designs they can frequently be used in large numbers. I do not advise wasting valuable time in breeding things which are known to be excessively common, but when it costs little or no effort, take everything. "Common" is a bugaboo which frightens inexperienced collectors. Every perfect specimen is wanted in some collection.

A FEW COMMON VARIETIES.

Vanessa Antiopa (the Mourning-cloak or Camberwell Beauty) is noted for its beauty but is everywhere plentiful. Its caterpillars are gregarious and are found upon willows, elms and other foodplants in large colonies. They need not be taken until they have reached the last molt and will pupate in a few days. Despite the fact that they are very common it is wise to take hundreds of larvæ each year in the hope of obtaining aberrations. This applies to all species, as aberrant forms are greatly sought by all entomologists. *Melitæa phæton*, *chalcon* and *palla*, *Pyrameis huntera* and *cardui*; *Junonia cœria*; *Neonympha eurytris*; *Cœnonympha californica*; *Thecla melinus*, *damon* and *augustus*; *Chrysophanus thoe*, *helioides* and *hypophleas*, all the *Pyrameis* and *Vanessa* families; *Chlorippe celtis*; *Satyrus alope*, *charon*, and a number of other varieties would be found in most lists of common species, but many of these are bright colored and are desirable in art work. If a butterfly is beautiful, bright hued, at all brilliant, it is salable. *Pyrameis atalanta* is a good seller, although it can be reared in vast numbers. Many *Papilios* are common enough in wide regions of country, but all are worth collecting and several species are exceedingly rare. It is a safe rule to collect or breed one thousand of every species and store them away until needed. It is so easy to rear some kinds that you could make more money selling them at one cent apiece than you could by rearing some rare species at a dollar per specimen.

WHY NOT BREED RARE VARIETIES EXCLUSIVELY.

"Why not raise rare species from the outset?" "Why bother with common kinds?" These interrogatories are frequently propounded. The answer is simple. You would not know the rare species if you were told their names, nor would you be able to obtain eggs or larvæ at the outset. By breeding all kinds you are certain to secure some that are rare, and if your locality has not been systematically worked, you are quite sure to find new species. If you find eggs, larvæ or cocoons, you will not know their names until the adults appear, hence you must take all you find and patiently await results. Pupils who fail are those who confine their efforts to one or two or only a few species at the outset. This is all well enough when you know what you are rearing and how to rear them. Confine your labors to one species of caterpillar and some disease may sweep away the entire brood, or some neglect will cause them to perish, or when they hatch they may prove "immensely common." If I were to devote all my time to obtaining eggs and specimens of *Papilio indra*, I would probably starve, yet it flies here and I will obtain all that I possibly can. I can sell every *Hepialus mcglashani* Hy. Edw., and every *Melitæa mcglashani* Rivers that I can take or breed, and this is the home of these species. So rare is the latter that dealers will sell you "fake" specimens of other *Melitæa* under this name. It flies from May until July, but with all the effort I could put forth I captured and bred less than one hundred *Melitæa mcglashani* Riv. last year. When you learn what is rare breed all of them you can, but if you want best results do not despise commoner varieties, especially at the outset.

LEARN HABITS OF RARE SPECIES.

When you discover rare varieties of lepidoptera, make strenuous efforts to obtain large numbers of specimens. Dr. William Barnes, of Decatur, Ill., writes: "Even the rare species are, as a rule, common enough. The only trouble is to find the right time and place and learn their habits. For example, there is a small moth found in Colorado, a beautiful thing, with red wings and a yellow body. Now Bruce, an old collector, whom your father has heard of, and myself had collected all around that locality for several years and never ran across it, and yet it was there and common all the time. Osler and his wife were out one day collecting and she picked one of those red field daisies just because it was pretty, and while she was idly picking the petals off it she saw one of these moths sitting down in the flower, its red wings matching exactly the color of the flower. They then looked around on the daisies and soon had a couple of them, and there is no trouble at all for any one to get them now, but the moth did not come to sugar or light and did not fly in the daytime, so Bruce and I had entirely overlooked it."

PREPARE YOUR LISTS.

Many letters ask "what do you wish from this locality?" There are fields which have been so well worked that published lists can be obtained of the species to be found in those localities. This is the exception, however, rather than the rule. Several hundred collectors have visited Truckee because it is on the Central Pacific and in the center of a great tourist resort. Many rare species are known to exist here and most entomologists could name species which they would gladly purchase. But if I asked these learned men what species they wanted from Meadow Lake, Webber, Independence, or any of the mountain lakes twenty miles northward, few could answer. In other words, the science of entomology is in its infancy, and perfect lists of moths and butterflies have been published of few localities. New species abound in almost all regions, and that is why the business of the butterfly farmer can be profitably carried on almost anywhere. You must prepare the lists of your own neighborhood. When you capture a butterfly or moth compare it with those figured in the plates of Holland's books and see if you can name it. If you are in doubt, send it to me or to some one else who will correctly identify it. Write down the names of all kinds that you discover. When dealers and purchasers receive these lists they can intelligently inform you what they wish to buy.

CARE DURING HATCHING PERIOD.

Do not allow too many adults to emerge from cocoons in the same cage at the same time. In struggling to find suitable places to hang while their wings are drying they crawl over and damage each other. Their sharp claws cut gashes in each other's wings. Again, when many specimens have emerged in one cage on the same morning, the wings of some will dry sooner than others, and their fluttering about the cage will injure the wings and plumage of their mates. Any paper box which is large enough to allow the wings to expand will answer for a hatching cage, hence there is no excuse for overcrowding. Care should be taken that there is no litter or rubbish in the bottom of the hatching cages under which the freshly hatched moths may attempt to hide

before their wings are fairly dry. This is especially applicable to the smaller varieties, which are apt to try to conceal themselves from the light while their wings are still limp, and are thus deformed. Many species develop better in the semi-darkness of covered paper boxes. Care and close observation during the hatching period is as essential as during any other stage. It is a beautiful spectacle to see a score or a hundred newly hatched adults expanding their wings and making their first short flights in a cage or room, but you enjoy it at the expense of many a perfect specimen.

BUTTERFLIES CLING TO THE FINGER.

To remove a butterfly or moth from one cage to another or to place it in the cyanide bottle, grasp it with thumb and finger firmly but gently by the under side of the body, at the base of the wings. This is the method usually employed by collectors. If the insect is to be killed, a firm squeeze between thumb and finger stuns it so that it will not flutter when placed in the bottle. If you wish to handle live butterflies without exciting or disturbing them, touch the under side of their head with the end of your finger and they will step upon and cling to your finger. In transferring them from the hatching box, or mating cage, this method is preferable, for if you grasp them with thumb and finger and forcibly tear them from the place to which they are clinging they are likely to be injured. Practice and experience endow the entomologist with what is termed "the butterfly touch," which is the faculty of grasping and handling the insect with a firm but gentle touch which does not displace the delicate scales. It can not be easily described, but you will surely acquire it by experience. Until you do so it is wise to always lift and transfer a live butterfly or moth by letting it crawl upon and cling to your finger.

HATCHING BY ARTIFICIAL HEAT.

Sometimes adults emerge from pupa much earlier if forced by artificial heat. Investigations are being constantly conducted along these lines by scientists and pupæ are sometimes kept in ovens, at an even temperature, to hasten the hatching period. If it were possible to have the large silk moths emerge at Easter, there would be a great demand for them, alive, to liberate in the establishments of florists, or in show windows, or at balls and grand functions. If certain species could be hatched out during the Christmas holidays they would find a ready market for these purposes. Specimens whose hatching period is forced by keeping the pupa in artificial heat are apt to vary in color from the normal, and such variations are highly prized by scientists. There is a broad field for experiment and investigation in this direction. It is a well understood rule that cold retards and warmth hastens the hatching of moths and butterflies. All butterfly farmers are in a position to conduct experiments of this kind with pupæ of different species, and to obtain results which might be of great scientific and financial value.

FOLD WINGS OVER BACK.

Many butterflies and some moths fold their wings under their body just before they become unconscious in the cyanide bottle. Before they have time to "set" or harden in this position empty them out of the bottle and place the wings over the back. To do this, lay each one in the open palm of your hand and insert the points of the forceps between the wings, from the front, and gently but firmly press the jaws of the forceps downward and force the wings open. As the wings open grasp the two sides of the body and base of the wings with the forceps, and lift the insect from the hand. Then insert your thumb and finger between the wings and press over the back, touching only the under side of the thorax and the base of the wings. When the wings are in proper position, folded together over the back, give a firm pressure to the upper portion of the thorax and under base of each wing. Never put a butterfly in a paper envelope with its wings in any position except folded together over the back. Many correspondents send me specimens which would be perfect were it not that the wings are extended or folded under the body. This allows the paper to rub directly against the scales on the upper surface of the wings and ruins the specimen. Touching the under side of the wings at their bases or grasping the under side of the thorax in pinning the insect, does not injure the plumage on the upper side of the body and need not injure the scales on the under side. A little practice will make you perfect. When the wings are properly folded over the back after the fly is unconscious, they will usually remain in the proper position. If they will not, place them at once in a paper envelope, by grasping them with the forceps near the base of the wings, while your thumb and finger are holding the wings over the back. If the insect is not dead, the papered specimen may be put in a large cyanide bottle or in a collecting box containing cyanide, or gasoline may be dropped upon the outside of the paper over the thorax and body. At all events do not let flies whose wings are folded under their bodies remain in the collecting bottle to be spoiled by the fluttering of other insects.

N. B.—TO ENABLE ME TO GIVE MY PERSONAL INSTRUCTION BY LETTER TO EACH PUPIL THE CORRESPONDENCE COURSE WILL BE LIMITED. ONLY A SMALL EDITION OF "THE BUTTERFLY FARMER" IS PUBLISHED, AND, ALL SUBSCRIPTIONS DURING THE YEAR WILL BEGIN WITH VOL. 1, NO. 1.)

Address all letters: (MISS) XIMENA McGLASHAN,

Truckee, California.

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A MONTHLY MAGAZINE FOR
AMATEUR ENTOMOLOGISTS



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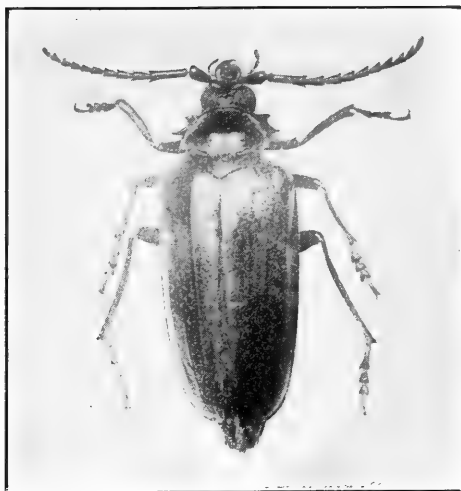
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PRIONUS CALIFORNICUS MOTSCH.

Rensselaer J. Smith, M. D., Milpitas, Cal.

The family of our illustration is a very large and beautiful one, the Cerambycidae (Long-horned beetles). Sub-family Prioninae. Species *Prionus Californicus* Motsch. Natural size, cut original. Taken at electric light July, 1913.

External anatomy Coleoptera or Beetles:

For simplicity divide into three regions; the head, thorax and abdomen.

The heads of beetles vary greatly in shape and size. The head is joined to the thorax by a membrane and is more or less constricted into a neck. The mouth, eyes and antennae are parts of the head. Examine the eyes of several beetles with a microscope and you will find that they vary greatly in size and shape. They may be called compound eyes as they are made up of many single lenses, some coarsely and others finely granulated. The lateral, movable, jointed appendages of the head are known as the antennae. Huxley states that they are the seat of smell. The number of joints vary from two to twenty-seven, ordinarily eleven. Mouth parts: upper lip labrum (la' brum); under lip labium (la' bi um); upper jaw mandibles (man' di bles); lower jaw maxillae (max il' læ).

Thorax or second part of body to which are attached the legs and wings: it is divided into three parts and starting from the head these are called prothorax, mesothorax and metathorax.

The leg: next to the body in the cut the visible part is the femur or thigh, next the tibia or shank, and the last part is the tarsus or foot which has segments, the last segment has two claws.

The wing-covers are called elytra (el' y tra), singular elytron. In different species these vary greatly in shape, sculpture, color and decoration.

America north of Mexico has nearly 12,000 species of beetles representing about 80 families.

MID-YEAR ANNOUNCEMENT.

The Butterfly Farmer is six months old and I wish to report progress. It was started as an experiment to ascertain if beginners in entomological work cared to pay the actual cost of their instruction. The subscriptions received have been sufficient to pay all expenses and all bills have been paid upon presentation. It was announced at the outset that this publication would not under any circumstances receive a larger income during the present year than would cover the actual cost of the venture, and that the edition would be limited to enable each subscriber to receive the personal attention his particular difficulties demand. Printing, a stenographer, and necessary incidental expenses are charged up to the subscription fund but there are no charges for rent, light, fuel or salaries. Neither myself, my father, nor any other person has drawn or will draw one dollar from the subscription fund for services rendered. The correspondence course will continue during the year and our cash book is open to inspection by any subscriber. The experiment will be conducted with entire fairness and all moneys received will be devoted to the betterment of the magazine.

The greatest novelty of my brief entomological career has been the attempt to assist beginners to learn butterfly farming. I am profoundly impressed with the fact that it offers pin money to housewives, a reasonable income to its devotees, and unbounded pleasure to lovers of nature and those who require an outdoor avocation. Scientists have taken commendable interest in my undertaking and many have sent me subscriptions who have no use in the world for my girlish instructions. If a 20-year-old girl will give her time and best efforts to the work of instructing amateur entomologists, those who remember the difficulties they encountered in learning the business are anxious to lend a helping hand.

In daring to publish a magazine devoted to the beginner I have not attempted to trench upon the province of the regular entomological magazines, and they have one and all extended to the Farmer the utmost courtesy and greatest possible assistance.

No adequate book of instructions for beginners has yet been published nor do I believe such a book would meet with sufficient sale to cover the cost of publication. All attempts to teach beginners by publishing a book have been financial failures. The fact is the beginner must be taught to begin. A young man or woman may have energy, patience, an ardent enthusiasm, and all the necessary qualifications of "a born entomologist," but unless his latent abilities are aroused he will go through life without knowing a moth from a butterfly. He would never think of buying a book on the subject and if he did he would be hopelessly discouraged by its seemingly learned and technical language. My experiment also consists in finding out whether a beginner can successfully teach beginners.

Correspondents have commenced writing me about my plans for next year and the future of the Butterfly Farmer. I have no plans and shall make no promises. It will all depend upon the requirements of my College course. The past six months' experiences have been pleasant and successful and I have abundant cause for thankfulness to the friends and pupils of the Butterfly Farmer.

ASSISTING THE EGG-LAYING.

Prof. John H. Gerould of Dartmouth College.

In connection with Egg Laying, one or two suggestions occur to me that may prove helpful to others. If one is desirous to produce as large numbers

of individuals from a single female as possible—an essential matter in studying variation and heredity—it is a great saving of labor and of the lives of the infant caterpillars to have the eggs wisely distributed over the leaves of the growing foodplant. I have found recently that the number of eggs laid by a single female may be very largely increased in *Colias eurytheme* and similar species, and may be placed exactly where baby caterpillars should be located to begin life under the best possible conditions, by grasping the female, when in a mood for laying, by the front margins of the fore wings and placing her in position to lay on suitable leaves. Standing on tip toes, preferably with her back to the source of light, she curves the abdomen, and deposits the egg upon end in exactly the right spot. Then she may be transferred, without once letting go of her wings, to another leaf. So you may go over the whole plant, as with a rubber stamp, planting the eggs where you please. This, of course, takes time, but it not only increases the output of eggs very materially, but also avoids the crowding of caterpillars that often results in disease, and makes it unnecessary to transfer the caterpillars to fresh leaves until they have molted at least once. A fertile female left to her own devices seldom, or never, lays all the eggs she can before old age overtakes her; and her distribution of the eggs, in the species with which I am familiar, depends largely upon her activity or sluggishness. If she is lively, she flies rapidly from leaf to leaf and distributes the eggs well; if she is sluggish and confined, she may lay a big clump of eggs on one small leaf, resulting in badly crowding the young caterpillars. I hope that some of your correspondents will be interested in raising the progeny of any aberrant female that they may capture or raise, and especially that they will breed species that are polymorphic, that is, represented by more than one variety of male or of female as in some skippers and Papilios, or by different varieties at different seasons of the year as in some of the azure blues, and publish the census of their results. Very little is known about the origin of new variations and species, or about the laws of inheritance of even the commonest varietal forms. Butterflies afford the best possible material for such studies. To watch and record the appearance of different varieties in a single brood has all the fascination of a game of chance, added to the esthetic enjoyment of the beautiful colors and forms, and the intellectual delight in seeking to follow and explain the mysterious workings of evolution, the creation of new kinds of living beings. I shall be glad to make more definite suggestions to anyone interested in undertaking studies of this sort.

LEPIDOPTERA OF MISSION SAN JOSE.

I desire each pupil to send me lists of the lepidoptera of their locality. The enclosed is a partial list furnished by Elizabeth Lowrie, Mission San Jose, California:

DIURNALS:

Anosia plexippus; *Argynnis calippe*; *Melitæa cooperi*, *chalcedon*, *palla*; *Phyciodes pratensis*, *mylitta*; *Grapta satyrus*; *Vanessa antiopa*, *californica*; *Pyrameis atalanta*, *cardui*, *caryæ*; *Junonia coenia*; *Basilarchia lorquini*; *Adelpha californica*; *Cœonympha californica*; *Satyrus boopis*; *Thecla melinus*; *Chrysophanus arota*, *anthoides*; *heloïdes*; *Lycæna acmon*, *piasus*, *exilis*; *Pieris protodice*, *vernalis*, *rapæ*; *Euchlœ creusa*, *sara*, *reakertii*; *Colias eurytheme*; *Papilio philenor*, *zolicaon*, *rutulus*; *Pyrgus tessellata*.

MOTHS:

Celerio lineata; *Sphinx cerisyi*; *Arcotonotus lucidus*; *Samia rubra*; *Telea polyphemus*; *Pseudohazis shastænsis*; *Illice nexa*; *Phryganidia californica*; *Estigmene acræa* (dubia); *Apantesis achaia*; *Halisidota maculata*; *Dargida procinctus*; *Stretchia muricina*; *Heliothis armiger*; *Stylopoda cephalica*; *Heliaca diminutiva*; *Annaphila diva*; *Syneda adumbrata*; *Catocala californica*, *faustina*; *Homoptera lunata*, *edusa*; *Melalopha apicalis*; *Harpyia cinerea*; *Malacosoma californica*; *Triphosa progressata*; *Prionoxystus robiniaë*.

SUGGESTED CORRECTIONS.

I am very grateful to receive suggestions correcting, explaining or differing from anything contained in *The Butterfly Farmer*. Correspondents will feel free to criticize, or in any manner assist in the work we are trying to do. We have received the following:

John F. Weigand, 1002 6th Ave., So., Wausau, Wis., writes:

"I would like to make what I believe to be a slight correction in your chapter on 'How to tell live pupæ.' If parasites are present, there will be no sound in the cocoon when shaken as the small parasitic cocoons are fastened to the wall of the other. When the caterpillar has died of the peculiar disease prevalent among so many varieties, the empty skin will rattle around inside like fine shot. You have just reversed the matter, but it is only of minor importance."

William Reiff, 366 Arborway, Jamaica Plain, Mass., says:

"At a proper occasion you will perhaps correct the point regarding opening of silken cocoons as published on page 63 of *The Butterfly Farmer*. It is never of disadvantage for the pupa to be cut open in any kind of cocoons of Lepidoptera, as long as proper care is taken concerning heat, moisture, etc. If a cocoon cut open does not give rise to a perfect specimen and the pupa was healthy and perfectly formed, the blame lies with the caretaker of the cocoon. Being very moderate in my estimate, I probably have raised during the last fifteen years about 20,000 specimens from cocoons. I always open my cocoons and I have not obtained a crippled specimen yet from a healthy pupa of which proper care was taken. Please bear in mind that we therefore are able to guarantee that perfect specimens will emerge from our cut-open cocoons which we sell, and the following season will always replace such cocoons as fail to produce perfect specimens. By giving this guarantee we only have a loss on material of 1% or 2% per year.

"You further should not have made this misleading statement (page 63): 'No inflexible rule has been published by which the male can be told from the female cocoon.' Regarding this much has been written and very constant characters are known. If this were not the case how could we fill the orders of those of our customers who order for their crossing-experiments just so many pupæ of each sex? When I find spare time if you care to learn about it I shall write a communication for your paper telling exactly the differences of sex as shown in pupæ."

TREE CRICKETS WANTED.

Prof. P. Parrott, Entomologist New York Agricultural Experimental Station, Geneva, New York, writes:

"We are making a study of tree crickets and we are trying to ascertain the distribution of different species, such as *Oecanthus niveus*, *nigricornis*, *quadripunctatus*, *latipennis* and *angustipennis*. We find that these fall into three groups and that our common species *latipennis* is the sole representative of one group. There is a species in the southern states and Mexico known as *argentinus* Saus, which is apparently a close relative of *latipennis*. I am writing to ask if you have specimens of it and are acquainted with its breeding habits. If so, could we obtain from you specimens of its work and some specimens of the insect itself? We will be glad to either buy the specimens or exchange for representatives of other species."

It will be a favor if our readers will assist Prof. Parrott. I fear that I cannot.

DETERMINING SEX OF MOTHS.

E. J. Smith, Sherborn, Mass.

In your directions for determining the sex of lepidoptera you do not mention the frenulum. This is in some moths a much surer way than any other except dissection. A few families of moths do not have it, but nearly all do. It is always single in the male and composed of from two to six or more bristles in the female. It is sometimes concealed so that a little denuding is necessary. To do this I use a small paint brush about one-sixteenth of an inch in diameter, the bristles of which have been cut off so as to make a rather stiff and blunt end. With this I rub the under side of the wings gently, close to the body, until the frenulum is exposed, and then with a lens of moderate power it is easy to see whether there is more than one bristle.

NAMING COLEOPTERA.

H. P. Loding, R. F. D., Houston St., Mobile, Alabama, writes:

"I take great interest in everything tending to promote the love of nature study in all its branches, and while I have never myself studied or collected with the view of being remunerated in any material way, I cannot help thinking that you are on the right track, in these worldly times. By showing people that there is money in the thing you will no doubt get a good many interested and started collecting, and once initiated in the pleasures and delights of studying nature the majority will stick to it, money or no money. I have been interested in nature study since boyhood, or for over thirty years, my father being Professor in Botany and Zoology in Denmark. Coleoptera has always been my favorite.

"In regard to naming your specimens of Coleoptera, I shall be glad to render you any assistance in my power. Through many friends I have a nice collection of correctly determined Coleoptera of the United States, and California species are well represented. I have a fairly good working library and would no doubt be able to determine a large proportion of your catch, but often I have to appeal to my friends who are specialists in certain groups for assistance, and very often the determination of certain species will be delayed for an indefinite time. One learned Professor has had material of mine for study and determination for several years and another for over one year, but it is sometimes impossible to reach a correct determination without studying a whole genus, and then only with ample material. I would rather have an undetermined species in my collection than one with a label which may prove wrong."

On this subject Dr. Rensselaer J. Smith of Milpitas, Cal., says:

"In a previous issue of the *Butterfly Farmer* several good methods for packing beetles to ship were given. Another very good way is they can be sent before drying, as in a fresh condition they can be handled with little danger of injury. Secure a strong wooden box, place in the bottom a layer of cotton, over it tissue paper, now a layer of beetles. Do not crowd. Another layer of tissue paper over the beetles, then a layer of cotton and so on.

"Always send a series if possible, when you wish a species named. It is sometimes impossible to make a diagnosis from a single specimen. Rare specimens should never be unmounted to be sent. In all probability they will be destroyed as age has made them very brittle.

"I know of an authority on beetles that had a series sent to him for determination. This was his reply: 'Without literature I am unable to determine your beetles. If they are of importance to you I will send them to some one that makes a specialty of this family and get them named for you.' This should not in any way discourage the beginner. It is good to have a hobby. Read all the books on the subject in which you are interested that are accessible. Take as many journals as your pocketbook will admit."

FILLING ORDERS FOR ART WORK.

Letters frequently reach me containing money from people who wish a box of specimens of butterflies and moths. Some are experimenting with art work and wish the bright-hued specimens of a particular size or color. Others wish to paint the flies and ask for striking combinations of color. By far the larger proportion of these orders are from persons who wish to own a box of butterflies, properly mounted. They wish them arranged in some neat and attractive form with a due regard to harmonious blending or contrasting of the colorings. As they sometimes put it, they want a "butterfly picture" on a small scale.

To fill these orders requires not only specimens which are spread, but necessitates at least a cigar box lined with cork linoleum and the payment of expressage. I make it a rule to fill no orders which are less than two dollars. Smaller sums are returned. The specimens sent range in value from ten cents to fifty cents each. A dozen of fair size and quality can be furnished for two dollars. These specimens are not necessarily perfect and are usually what dealers would term "seconds." Schmitt insect boxes or neat and serviceable boxes, are used to enclose the specimens when one desires to exhibit the butterflies to their friends, and in such cases the actual cost of the boxes is included in the order.

NAMES OF PURCHASERS.

The following are purchasers of eggs, pupæ or perfect specimens and pay cash for desiderata. They desire price lists. Satisfy yourself of their reliability, make your own contracts and deal with them on your own terms and at your own risk. All subscribers who are purchasers and all who have specimens for sale or exchange may advertise under this heading without charge:

Dr. William Barnes, 152 E. Prairie St., Decatur, Ill.

The Kny-Scheerer Co., 404-10 West 27th St., New York, N. Y.

Ward's Natural Science Establishment, 84-102 College Ave., Rochester, N. Y.

J. G. Duthie, editor "Canadian Thresherman and Farmer," Winnipeg, Canada.

- Herman H. Brehme, 74 13th Ave., Newark, N. J.
 Pattie Hutchinson, Beeville, Bee County, Texas.
 William Reiff, care of Entomological Exchange, 366 Arborway, Jamaica Plain, Mass.
 M. Rothke, 1957 Myrtle St., Scranton, Pa.
 Fred Breitenbecker, 427 East 144th St., New York, N. Y.
 Geo. P. Engelhardt, Children's Museum, The Brooklyn Institute of Arts and Sciences, Bedford Park, Brooklyn, N. Y., wants clippings or sections of food plants containing living pupæ of the Sesiidæ.
 H. C. Fall, 191 Raymond Ave., Pasadena, Cal.
 Fred S. Lozier, 21 Melrose St., Rochester, N. Y.
 Walter Stinson, 913 Prairie St., Elkhart, Ind.
 Mrs. Ellen Robertson-Miller (author of "Butterfly and Moth Book"), 1416 E. 68th St., Cleveland, Ohio.
 Carl J. Drake, Ohio State University, Columbus, Ohio, Department of Zoology and Entomology. Hemiptera. Water-striders wanted for cash or exchange.
 F. E. S. Bentall, The Towers, Heybridge, Essex, England.
 G. Maynard, 15 Galveston Road, East Putney, London S. W., England.
 Dr. R. Luck & B. Gehlen, Schlosstrasse 31, Berlin Steglitz, Germany.
 H. W. Head, Burniston, Nr. Scarborough, England.
 L. W. Newman, F. E. S., Bexley, Kent, England.
 Tony Matlach, V, Laurenzgasse 15, Vienna, Austria. 3 St., T. 21.
 Bertha Brauer, Lussinpiccolo, Ystrieu, Germany.
 Emil Krauth, Hebron, N. Dakota.
 W. Hogg, 79 Albert Road, Harrogate, England.
 H. W. Head, Burniston, nr. Scarborough, England.
 F. Tarniquet, 16 Rue Massol, Beziers, Heiault, France.
 Claudius Challiot, 83 Grande-Rue, Boulogne-sur-Seine, France.

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Mrs. Florence Peace, Hale Lanakila Home, Robello Lane, Honolulu, Hawaii, wishes names of purchasers of Dragon Flies from the Hawaiian Islands.

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Dora I. Llewellyn, 1101 Addison Road, Cleveland, Ohio.

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THE CANADIAN ENTOMOLOGIST.

A monthly Magazine Devoted to the Study of Scientific Entomology, Volume 46, begins in January, 1914. It is the oldest established magazine of the kind in America and has a world-wide circulation. Subscription, \$2 (postage paid) per annum, which includes a copy of The Annual Report of the Entomological Society of Ontario to the Legislature. Editor, Dr. E. M. Walker, Biological Department, University of Toronto, Toronto, Canada.

Published by the Entomological Society of Ontario, Guelph, Canada.

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A forty-eight page illustrated magazine, published monthly except August and September, devoted to the study of INSECT LIFE. It contains a list of the titles of the current Entomological Literature, and also articles by the leading Entomologists in the United States and Canada. Valuable information for the beginner, the economic entomologist and the systematist. To new subscribers, \$1.90; Renewals, \$2.00; payable in advance. Single copies 25 cents. Address Entomological News, 1900 Race St., Philadelphia, Pa.

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Inflated Larvae mounted on natural foodplants, at lowest prices. Work guaranteed expertly and artistically done. I refer, by permission, to Miss Ximena McGlashan, who purchases complete sets. Write for price lists.

Robert Dickson, 804 Duquesne Way, Pittsburg, Pa.

CORRESPONDENCE COURSE IN ENTOMOLOGY,

Conducted Under the Auspices of the Agassiz Association.

Lesson VI. Sugaring for Moths.

IMPORTANCE OF SUGARING.

I do not believe I would have ever become greatly interested in Entomology if I had not learned the fascination and financial profit of sugaring for moths. It was the first lesson my father taught me, and in giving personal instruction to summer pupils I make it the first lesson of the course. Whenever my correspondents tire of entomological work I know without ever being told that they have failed to practice sugaring. When pupils report at the close of the season that they have only a few hundred specimens to offer for sale one can read between the lines that they did not successfully sugar. My average catch during July and August of last year was 200 moths each night. Aside from the profit in perfect specimens obtained, there is the harvest of eggs from the damaged and worthless females which cannot be sold. I would contract to furnish 50,000 moth eggs during those two months of any year, if I could find a purchaser who would purchase so many at one cent apiece. It is little trouble to secure eggs from moths. I make the bold assertion that sugaring is the most remunerative part of the collector's work. It is quite true that comparatively few of the entomologists attach great importance to this branch of the work, but that is exactly why the field is so prolific. If a given territory has not been sugared it is almost certain to yield varieties which are new to science. Sugaring has discovered a score of new varieties of moths at Truckee, and I have no doubt similar results would be obtained in other localities.

AS GREAT SPORT AS HUNTING OR FISHING.

In keen enjoyment and true sport sugaring equals either hunting or fishing. One is thrilled with excitement at almost every step taken in the darkness amid the rustling bushes and trees along the river's bank. The flashes of light and the dense shadows which your lamp awakens in the foliage, the boulders, the stumps and fallen logs, or in the deep gorge and along the side of the high cliffs are apt to make one timid and fearsome at first. There are bound to be little surprises and half-adventures, such as the sudden whirl of a bird's wings or the crackling of a dead branch under the foot of some animal, and the gloom and solitude tend to make these harmless episodes almost tragic. People are not generally given to wandering around alone at night with a lamp and cyanide bottle, and the feel of the night air and the lonesomeness give plenty of "color" to your journey. It is barely possible that the gruesomeness and fancied danger has something to do with keeping people from enthusing over sugaring, but with a little experience these things add zest and spice to the fun. It is royal fun, and the supreme moment is when you approach a tree that is fairly covered with gloriously beautiful moths. They are ready to disappear at the slightest warning. They do not as a rule light upon the mixture but are found sipping at its edges where they can fly away the moment they sense danger. You must approach stealthily, and must work swiftly and dextrously. The least noise, a slight blunder, a little haste or an instant's hesitation and the prize specimens will be sailing safely above your head. When

you have turned your light upon the tree do not shift the rays away until you have finished, else the change from light to darkness may startle the wary watchers. It is a fact that some varieties of moths get stupidly drunk and it is no fun at all to take them, but to capture the really desirable species requires skill and adroitness and is great sport.

THE SUGARING OUTFIT.

Your sugaring outfit consists of cyanide bottles, a lamp, a pair of small forceps and plenty of small paper boxes and paper bags. Bags are very cheap, and are even better than boxes, but they are more cumbersome. Use ordinary paper bags such as the grocers employ, the large ones for large moths and the smaller sizes for small specimens. Simply distend the bag, put in the fly, and fold the edges tightly with two or three folds, leaving the bag still distended. These bags are for the battered, unsalable females, and in them they will lay their eggs. Carry a supply whenever you are collecting, day or night. They occupy little space when folded, and you distend them only as you use them. A bulls-eye lantern, or any kind of a lantern for that matter, will answer your purpose. The light shows you where the moths are and blinds and confuses them. Electric flash lights, such as officers use, are ideal, but the lamps and batteries must be renewed frequently and so they are too expensive. A "Baldwin Miner's Lamp," costing two dollars, is the best thing extant. It burns carbide, or acetylene gas, and the carbide can be bought in ten-pound cans for ten cents a pound, or in three-pound cans for fifteen cents. Fill the carbide receptacle half full, and when you wish to light the lamp fill the water reservoir. You may have a little bother to learn to use the lamps, but a beautiful light is obtained, and they are safe and easily handled. Braun-Knecht-Heimann Co. sell lamps and carbide. Their address is 576 Mission Street, San Francisco. Automobile supply houses, everywhere, keep these lamps. Have as many cyanide bottles as you can conveniently carry. An ordinary hunting coat with numerous large pockets is a valuable addition to your outfit, but a bag swung from a strap over your shoulder will answer. To spread the sugaring mixture upon the trees you will need a painter's brush, a whisk broom, or better still a small white-wash brush with the handle stuck in the back of the brush.

THE BEST SUGARING MIXTURE.

My favorite formula for a sugaring mixture is one quart of stale lager beer, one quart dark brown sugar, half pint Jamaica rum; stir well. This was the mixture used by Harry Edwards and the old-time entomologists. I do not pretend that it is the best preparation known, for nearly every collector has a formula of his own. I would esteem it a great favor if scientists would tell me their favorite formulas. W. J. Holland gives: "Four pounds cheap sugar, bottle stale beer, a little rum. Stir well." Herman Strecker writes: "Rum and sugar, or beer and sugar mixed to the consistency of syrup." Stale beer, especially steam beer, soon turns into vinegar and is worthless. Until it sours steam beer will answer. There is always some lager beer left in kegs after all that is salable has been drawn out, and by getting this, your beer costs nothing. If no beer is sold in your vicinity and you cannot secure the stale article, draw fresh beer and let it stand at least twenty-four hours before using. Your mixture is better if it is several days old, but may be used as soon

as mixed. If it stands for any length of time add a little fresh rum to give it the requisite odor, just before using. If you cannot get brown sugar, get any sugar. Brown is the cheapest and sweetest. If you cannot get beer use ale. If you cannot get sugar use molasses or honey. Follow the formula if possible, but it admits of great flexibility. In starting a route it is wise to use two or three times the quantity of sugar. Let it form a good coating on the trunks of the trees. Afterward the thinner mixture will answer. Occasionally vary the quantity of rum and note the results. If your trees become too sticky add more beer for a few nights. Cane sugar gives better results than beet sugar. Some authorities recommend cooking the mixture and molasses or honey may be added to the ingredients. A quart each of brown sugar, molasses and stale beer may be heated and allowed to boil for two or three minutes, stirring well. Keep in open receptacles until needed for use and then add the rum.

WHERE BEER AND RUM CANNOT BE OBTAINED.

In prohibition districts, and in the army, beer and rum cannot be obtained. Fortunately there are very good substitutes which will answer fairly well. J. H. Comstock's "Insect Life" recommends "a paste made of sugar and water; unrefined sugar is the best for this purpose as it has a stronger odor than white sugar." Strecker gives cider and sugar. Packard's "Entomology for Beginners" suggests sugar and vinegar. Honey smeared upon trees, comb and all, attracts moths. W. C. Dukes, Mobile, Alabama, writes: "We have had fair luck with limburger cheese, and last year my wife made 'grape-juice' from Catawba grapes and I used the pulp after she had finished, both smearing on the trees and hanging the bag up, and it attracted both moths and flies and also beetles. I have a friend, Prof. Smith, Curator of the University of Alabama, who spent some years collecting in Paraguay, South America, and he says he had best luck using his guide's undershirt, which was saturated all day with perspiration. He would hang it up at night and the moths would flock to it." Herman Strecker says: "Soak pieces of dried apple and string them with a darning needle on pieces of twine and festoon them on fences, trunks of trees, and other places." Decayed fish or the rind of a side of bacon, or cloths saturated with the brine from meats, have each been used with success. A mixture of sugar and rotten apples, or other decaying fruits is extremely good. Nathan Banks in "Directions for Collecting and Preserving Insects," says: "A mixture of sugar and vinegar, or sugar and molasses, to which is often added beer or some other alcoholic liquor, is most favored by collectors.

THE SWEET SAP OF CERTAIN TREES.

Bentley B. Fulton of The New York Agricultural Experiment Station, Geneva, N. Y., writes that he has obtained large numbers of moths on maple trees from which the sap was flowing and from the stump of a tree that had recently been felled. He writes: "I collected them just after dusk. They were so full and contented that I had no trouble in picking them up with my fingers and dropping them in the bottle. Certain birch trees also have sweep sap in Spring, but I have never tried tapping them for collecting." Oscar Hagen of Salt Lake City, Utah, writes that sap oozes from the holes bored by larvæ in the Lombardy poplar and that butterflies collect upon it. He

writes: "The butterflies were so busy feeding upon the sap that you could pick them off the tree at any time in the day." Where sugarcane grows the green stalks, split open with the pith exposed, can be tacked on trees with success. Crushed grapes and fruits of all kinds, with the addition of sugar and liquor is good. Mrs. Avis B. Roberts, of Truckee, Cal., prepares a tempting table relish for meats which is appropriately called "Heavenly Hash." Take one quart of brandy and to it add one quart of sugar and one quart of fruit or berries. This forms the base and to it may be added a quart each of any kind of fruits or berries desired, a quart of sugar being used with each quart of fruit. At the beginning of the season, to make the receipt clear, take one quart each of brandy, sugar and cherries; as the season progresses add a quart of strawberries and a quart of sugar, a quart of raspberries and a quart of sugar, a quart of sliced peaches and a quart of sugar, etc. A quart of brandy can be obtained at any drug store and no further liquor is required, no matter how large the quantity of fruit and sugar is placed therein. Mrs. Roberts finds that the juices of this mixture form a most excellent sugaring compound, and with it she has captured large numbers of moths.

THE SUGARING ROUTE.

A great deal depends upon the selection of a favorable route, but a single tree in a door-yard, a barn, fence or outhouse may answer for an experiment. It is advisable to sugar in different localities until you ascertain where the moths fly thickest. Authors differ greatly as to the best places. One will tell you to select shady nooks and secluded places by old roadsides, and another will tell you to avoid them. I do not believe that any definite instructions can be given. It all depends upon local conditions. Authors differ as to the number of trees you should sugar, one telling you to sugar fifty trees and another only two or three. I have a number of routes and discover that certain species of moths favor each of them. One is along the bank of the Truckee River, in the rear of stables, cabins and shanties, and where there is much refuse. This route consists of a dozen trees and is about two hundred feet in length. I go over it from early twilight until late at night, or until the moths cease to come in sufficient numbers to justify, or until I am too weary to work longer. The largest catches are made at dusk when the first rush of moths arrives, but I have frequently taken as many as fifty specimens on a midnight visit. Some of the routes are reached by bicycle and the sides of a lake or streamlet miles from town are good collecting grounds. Dense forests and clean, ideal parks, or grassy fields are not apt to be favorable. Just as moths enjoy the odor of limburger cheese just so they seem fond of refuse and bad smells, and the outskirts of a town generally prove most profitable. Experience is the only guide.

HOW AND WHEN TO SUGAR.

Spread the sugaring mixture upon almost anything; tree-trunks, boards, buildings, logs, stumps, rocks, posts, fences, grain sacks and even upon bushes, flowers, and the leaves of trees. White cloths sugared and tacked to trees or boards attract certain species. The mixture should be sprinkled upon bushes, flowers and leaves, but upon any firm foundation you should apply it with a brush, put on plenty, and without wasting you should not be stingy. Sugar in identically the same places night after night. Apply the mixture

in strips four or six inches wide up and down the trunk of a tree, at a convenient height, making the strips say a foot in length. After a few applications a thin glaze of sugar will remain on these places and the mixture may be thinned. If your prevalent winds come from two directions (in Truckee the wind blows either from the east or the west), sugar on opposite sides of each tree. You will generally find the most moths on the sheltered side. Apply the brush vigorously to the spots sugared. The odor attracts the moths and is of course stronger if you apply a larger quantity of the mixture. Cold, stormy, foggy or very windy nights are not profitable, but I work every night that moths fly and have frequently done well between the showers of violent thunder storms or when a fine misty rain was falling. I think the trouble with some collectors is that they wait for warm, still, murky nights or those following hot sultry days. These are doubtless best, but steady, persistent work for a couple of hours every evening is the real way to obtain results. The first night that you sugar or perhaps the first two or three nights of a new route you may take very few flies, but they will soon become wonted to the sugared spots. Some authorities claim that moths will be attracted from a distance of half a mile.

CATCHING THE MOTHS.

Flash the light upon the sugared spot, place the mouth of the cyanide bottle over the moth and quickly and deftly apply the cover. If the moths are stupid from the intoxicant used they will fall to the ground when alarmed, instead of attempting to fly away. Indeed, they generally protect themselves from danger by dropping to the ground. Ordinarily, therefore, you hold the bottle at an angle of about forty-five degrees, the lower rim of the mouth of the bottle pressing against the tree just below the moth, trusting that the moth will drop into the bottle. By grasping the neck of the bottle with the thumb and last three fingers, the forefinger projecting over the neck of the bottle, you can frequently flip the insect into the bottle by striking its head sharply with the forefinger. But in catching *Catocalas* or other large, rare moths place the mouth of the bottle over the moth and directly against the tree, rendering it impossible for the moth to escape. When a moth thus imprisoned remains stationary, move the bottle downward or sideways until the rim touches its head. If it will not drop then, but simply crawls about inside of the mouth of the bottle, touch it with the finger. A very large moth can be taken with a small bottle if the rim of the bottle is placed over the head of the insect. Care must be taken, however, not to injure the wings by pressing the body with the lower rim of the bottle. Should the mouth of the bottle get smeared with the mixture rub it with a damp cloth and remove the moisture with a dry one. Moths which drop to the ground may be picked up with the forceps by grasping them by the thick portion of the wing close to the body.

SORTING THE CATCH.

I begin work in the middle of my route and here I leave a quart cyanide jar which I call the "morgue." Each time I pass this place I sort over all my insects by emptying them out of the bottles on a piece of paper, or the tin cap of a fruit jar, picking each one up with the forceps, and carefully examining it. If it is perfect, I place it in the morgue to be pinned and sold. The males that are damaged are allowed to go, and the damaged females

are placed in paper boxes or bags. The cyanide is a powerful anaesthetic and soon renders the flies unconscious, but they will revive if released from the bottle within ten or fifteen minutes. Remember that if damaged ever so little, specimens cannot be sold. Large proportions of your catches are unsalable, but if the females lay eggs they are of greater value than when perfect. Until you learn to know the rare varieties it is wise to save all the damaged females, but when you ascertain the valuable species you will confine your efforts to obtaining the eggs of these. It is so little trouble to obtain moth eggs from either the rare or common kinds, and moths lay so many eggs, that sorting and saving the females becomes the most important work of the butterfly farmer. Never touch an insect with your fingers except when pinning it, and then only on the underside and with greatest care. Your forceps should be your inseparable companion on sugaring trips. Never place beetles in the same bottle with moths or butterflies. Carry at least two or three bottles so that it will not be necessary to have a number of fluttering moths in one bottle. Paper bags may be pinned to a clothes-line with clothes-pins which snap together with a spring.

VALUE OF MOTHS.

There is greater interest in moths at the present time than at any other period in entomological history. Possibly because the butterflies of the United States have been pretty well worked up, or because the study of the moths offers such a marvelous field for research, many learned scientists are working almost exclusively with the moth families. A large number of specialists are devoting all their talent and energy to particular groups and genera. The entomologists of other countries are eager to secure collections of American moths and the demand for them is constantly increasing. Many species bring fancy prices and the entire season's catch can be disposed of at fair figures. Each collector who understands how to successfully sugar can offer thousands of perfect specimens each year. The probability of discovering species new to science justifies thorough work in each locality. Large numbers of moths can be taken at lights, especially where an electric plant has been recently installed. Searching flowers at night with a carbide lamp and cyanide bottle often yields excellent returns. There are many varieties of traps which may be used to advantage. Attracted by the head-lights of locomotives moths are frequently carried into round-houses by the engines. Hundred of larvæ may be obtained while sugaring and by beating bushes at night and can be found under the leaves and debris under plants and trees. But when all is said, the best and most satisfactory method of collecting large numbers of moths is by sugaring.

N. B.—TO ENABLE ME TO GIVE MY PERSONAL INSTRUCTION BY LETTER TO EACH PUPIL THE CORRESPONDENCE COURSE WILL BE LIMITED. ONLY A SMALL EDITION OF "THE BUTTERFLY FARMER" IS PUBLISHED, AND, ALL SUBSCRIPTIONS DURING THE YEAR WILL BEGIN WITH VOL. I, NO. 1.

Address all letters: (MISS) XIMENA McGLASHAN,

Truckee, California.

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VOL. I

MARCH, 1914

No. 7

THE BUTTERFLY FARMER

A MONTHLY MAGAZINE FOR
AMATEUR ENTOMOLOGISTS



XIMENA McGLASHAN
Publisher and Proprietor
TRUCKEE, CALIFORNIA

C. F. McGLASHAN { *Associate Editor*
 { *Business Manager*

*A Comprehensive Correspondence Course in Entomology,
Conducted Under the Auspices of The Agassiz Association,
Will Be a Leading Feature During the Present Year.*

Subscription, in advance, \$5 per Year.

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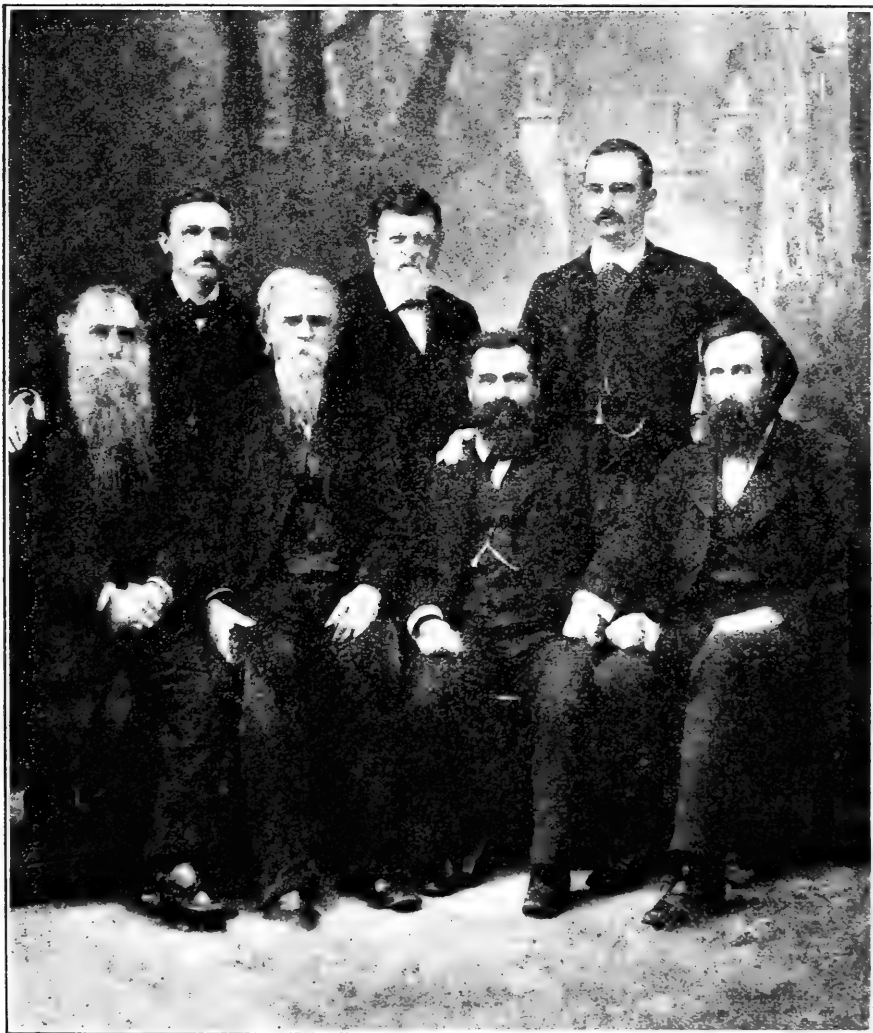
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PIONEER ENTOMOLOGISTS OF CALIFORNIA.

The illustration on this page shows seven of the pioneer Entomologists of California. The history of science in the early days of California is very interesting and will soon be issued in book form by Prof. Fordyce Grinnell, Jr., of Pasadena, California. To Prof. Grinnell, Charles Fuchs, F. W. Nunenmacher, James E. Cottle and Mrs. J. L. Harford I am indebted for the following information.

Prof. John James Rivers died at Santa Monica December 11, 1913, aged 89 years 11 months and 5 days. He was born in England and came to America in the early 'seventies, settling first in Kansas. Was Curator of



ALBERT KOEBELE	JAS. H. BEHRENS	T. L. CASEY
J. J. RIVERS	GEO. W. DUNN	CHAS. FUCHS
		W. G. W. HARFORD

Organic Natural History in University of California many years until 1895. The closing years of his life were spent at Ocean Park and Santa Monica. He studied and wrote on Coleoptera, Lepidoptera, reptiles, fossil and living shells. He described several new species. His last paper describing a new fossil shell from San Pedro was published in the Bulletin of Southern California Academy of Sciences in July 1913. He was a great naturalist and a splendid gentleman and all who knew him will always hold him brightly in memory. He took an active interest in the California Academy of Sciences. Like the others in the group, he was associated with all the early scientists, including John and Joseph LeConte.

Albert Koebele has collected specimens for the Department of Agriculture at Washington in various parts of the world, ever since he was of age. At present he is on a three years' leave of absence in Germany.

George W. Dunn collected Coleoptera all over the Pacific Coast. He died in San Francisco in 1905.

James H. Behrens was a famous collector, chiefly of Lepidoptera, during the early days of California. He died in San Jose in 1897 having previously sent his fine collection to Lubeck, Germany. Several insects bear his name.

Prof. Charles Fuchs resides at 713 Lincoln Ave., Alameda, is Curator of Entomology of the California Academy of Sciences in San Francisco and is one of our best known Coleopterists. He was one of the five members who started the Brooklyn Entomological Society. For some years he was in charge of the Entomological Department of the University of California.

Col. Thomas A. Casey, a distinguished writer on Coleoptera, is in Washington, D. C. He has achieved a world-wide fame and is in the very zenith of his activity and usefulness.

Prof. W. G. W. Harford was born in Rochester, N. Y., December 30, 1825; died March 1, 1911. For several years he was a director of the Academy of Sciences in San Francisco, and for four years was connected with the University of California. He studied and described Crustacea and shells and collected plants and insects. *Colias Harfordii* Hy. Edw., was named in his honor.

The original photograph from which this cut was made was presented to my father by Albert Koebele at the time it was taken. I should be thankful to receive photographs of all the pioneer Entomologists of this state and will return them if desired.

COMMERCIALIZING SCIENCE.

"The Butterfly Farmer is interesting, but I don't like the commercializing of the Science. The real interest is lost." This is from the letter of a friend and helper whose name is enrolled among the famous entomologists. The answer I made contains an earnest appeal for further light, and is published in the hope that I may receive replies from many scientists. I wrote thus:

I wish you had been more explicit in stating your objection to "commercializing science." Has there ever been a time when collectors did not receive money for specimens? Do not many scientists have to accept positions because of the salary? Is it not true that four-fifths of the entomologists of America are selling their talents in State Insectaries, in the employ of the Government as Curators of Museums, as assistants to those owning great collections, in order to get bread and butter? Do not the teachers and professors in our schools and colleges barter their scientific knowledge for the means of a livelihood? Is the

girl who rears butterflies and moths and sells them to get money to pay her board, clothes and tuition on a lower plane than these admittedly great scientists? I am really frank in saying that I do not know where or why a distinction can be drawn. Can you make it plain to me?

I am ready to admit that the individual who begins the study of entomology or of any of the sciences with a purely mercenary motive, with no higher desire than to obtain the money which the business affords, is in no better position than the one who studies law, medicine or any profession or avocation with the thought of earning money with which to support himself and his family, and just as these men sometimes bless mankind because of their energy, enthusiasm and great knowledge in their chosen work, just so it is quite possible that the woman who breeds lepidoptera or collects coleoptera to enable her to make a living, may at last become entranced with the beauties of scientific research and make her mark in the scientific world.

Perhaps it is girlish ignorance which leads me to think that it is a very noble and praiseworthy thing for a girl to learn something which will enable her to support herself. With all the dire poverty and pitiful want which exist in this twentieth century, I wish I could tell every young girl how to make a living. I wish I could convince her of the profits to be obtained from a few hives of bees, or from raising silk-worms, or from breeding rare varieties of moths and butterflies which the true scientist who scorns her "commercialism" has not the time or opportunity to breed.

I know that you have been a College Professor, and I understand that you are amply endowed with worldly goods, and I know that you are a devotee of Science because your heart glows with a sincere love for its God-like mysteries. But I trust you are too generous and broadminded to forget that many boys and girls who are endowed with talents, tastes and scientific yearnings cannot dream of studying any branch of science unless they can earn the price of their living and tuition.

I was not thinking or planning to complete my college course until my inspiration came from the money which Dr. Barnes paid me for last year's catch. I did not dream of College because I did not have the money necessary to pay my expenses. Will you, or will any learned scientist scorn my future work, if I accomplish anything during my lifetime, because my start in science was based upon "commercialism"?

My admiration for you and the work you are doing is profound. You have helped me cordially, bountifully and with unstinted generosity. In the friendliest possible spirit and with a deep veneration for your good opinion I venture to suggest these thoughts in order that you may convince me of the error of the position I assume.

THE FUN OF SEEING THINGS.

This is the heading of a new department in "The Guide to Nature," which will strongly appeal to young and old. The Guide has been enlarged and improved and takes first rank as a general magazine of nature. Dr. Edward F. Bigelow has for over fourteen years been editing the "Nature and Science" department of "St. Nicholas," but has discontinued this work in order to devote his entire time and energy to "The Guide to Nature." With his wonderful ability and experience he is peculiarly qualified to make his publication all that its name indicates, a perfect Guide to Nature.

FINDING AND FEEDING CATOCALA LARVÆ.

(Lulu Berry, Vinton, Iowa.)

In the spring when the buds begin to swell, I take a peep every morning at my collection of *Catocala* eggs, in their little tight glass jars, for as early as April seventh I may find the *ilias* and *ultronias* hatching. When I discover larvæ I put a few twigs of oak in the *ilias'* jar and twigs of wild cherry, apple or plum in that of the *ultronias*. The tiny caterpillars soon bore circular holes in the leaf buds. The weather may prevent the eggs of these species from hatching until a month later.

I think our earliest species of *Catocala* are *clintonii* and *nubilis*, but I have not studied the life-history of either. *Unijuga*, *cerogama*, *innubens*, *parta* and *amica* are also early species, while the larvæ of *amatrix*, *cara*, *relictas*, *vidua* emerge later. The *relictas* hatch, a few a day, from May sixteenth until well into June, but *ilias* and *cerogamas* all hatch at about the same time, which makes it easier to care for them. If the weather is unfavorable, however, a scarcity of the species may result. When much rain falls and the leaves expand rapidly *Catocala* larvæ are liable to succumb to dysentery. Heat is very unfavorable to them, and they prefer a weak light. Many young larvæ drown in the moisture which collects on the sides of their jar. "Eternal vigilance is the price of safety," and one can hardly look at the jars too often, not disturbing the inmates, of course.

As the larvæ grow they must be transferred to larger jars or boxes, for overcrowding invariably produces bad results. After the food-leaves expand, I usually gather them about sundown. In pleasant weather they keep fresh in the glass jars, but in hot weather I wrap the stems in a wet cloth and again in oiled paper.

Cleaning the jars is, perhaps, best done in the morning, but one should never disturb larvæ while they are moulting. Pieces of paper placed in the cages are utilized by the larvæ in forming their cocoons.

I have reared here at Vinton, Iowa, *piatrix*, *neogama*, *vidua* and *relecta* on walnut and hickory. *Palaeogama* and *piatrix* are big spotted fellows, very easily raised from the egg, but I have never found these larvæ on their food tree. *Neogama* larvæ, however, may be found almost any day in June on walnut or butternut. Stripping off hickory bark I have found *vidua* and *habilis* larvæ beneath.

Lucianas from Colorado and *aholibahs* from Utah do well in this locality. I should say that for successful rearing of *Catocalæ* the prime requisites are coolness and shade, plenty of food, always fresh; pure air, gained by opening the jars daily, and reasonable cleanliness. Some species—*innubens* especially—are very liable to escape at pupating time. If only a thin glass plate covers the jar or box, it is well to place a weight on it.

Concumbens is a fine specimen which feeds on broad leaved willow, as does *cara*; while *parta* and *amatrix* select the slender leaved or white willow. *Amatrix* also feeds on cottonwood, but I have never found *parta* upon this tree.

I never find *innubens* larvæ on their food tree, the locust, but some distance from it, hiding under paper, boards, and the like; while *minuta*, another locust feeder, is found in the bark grooves at various elevations.

Fully grown *grynea* larvæ are easily found in crevices of apple bark, *ultronias* on plum twigs and thorns, especially on dead twigs. The only *clintonii* larvæ I ever found was on plum, May 5, 1913, and as it was in-

distinguishable from *ultronia*, I was much surprised when the resultant cocoon gave a yellow-winged moth instead of the red-winged *ultronia*. Later, for the first time, I found two of these moths in our woods.

It may be of value to those unfamiliar with the *Catocala* group to learn that *unijuga* feeds on poplar, *cerogama* on linden, *parta* on willow and poplar, *innubens* on locust, *amica* on oak, *amatix* on willow and poplar, *cara* on willow and poplar, *relicta* on aspen, willow, poplar and wild birch, *vidua* on walnut and hickory, *relecta* on hickory, *palæogama* on walnut and hickory, *piatrix* on butternut and *neogama* on walnut and butternut.

TRICK IN MOUNTING NOCTUIDS.

(By Foster H. Benjamin, 118 McDonough St., Brooklyn, N. Y.)

One day last summer, when I was over to the Brooklyn Institute of Arts and Sciences, Mr. Jacob Doll, Curator of Entomology, very kindly taught me a new trick in the mounting of noctuids. Make a solution of gum tragacanth, such as cigar makers use, and after the insects have properly dried on the spreading boards, take them off, and with some delicate instrument put a little of the paste just where the wing hinges on to the body, on the under side. Put the specimen back on the spreading board and allow to dry for another day or so. The gum dries, and holds the wings out at the angle of the spreading board. It is transparent and so does not look bad, indeed cannot be seen if done properly, while by doing it all the noctuids in a collection will then have their wings spread at the same definite angle. Noctuids, as you know, are poor things to mount because of the habit of the wings drooping after removing them from board. This plan is the only one that I have ever heard of which gets rid of this difficulty which makes a good collection look like the work of some one who has only had a few days at mounting and doesn't know how.

SUGGESTED CORRECTIONS.

I am very grateful to receive suggestions correcting, explaining or differing from anything contained in *The Butterfly Farmer*. Correspondents will feel free to criticize, or in any manner assist in the work we are trying to do. We have received the following:

Foster H. Benjamin, 118 McDonough St., Brooklyn, N. Y., writes:

"I note that one of your correspondents views formold with somewhat of disfavor. He states that alcohol is far better. Perhaps it is, but in my estimation it is not. Alcohol, unless very carefully used, destroys specimens, causes some to turn black, and many to fall to pieces. Formold does not do this. If you use it, 1 part (40% solution) of it to 20 parts water, you will have an ideal preservative for all kinds of insects except *Lepidoptera*. Of course, it causes sp. to lose color; but alcohol does the same and more quickly. It hardens insects it is true, but this is no evil, as then the insect cannot deteriorate as it might in alcohol. Besides if you want to get the insect soft so as to mount it all you have to do is to put it in a little warm water. This removes the chemical and relaxes the insect.

"I note that another correspondent states that cyanide makes insects like certain specimens of wasps, etc., almost impossible to spread. I do not think that the gentleman has tried putting his wasps in a relaxing box for a few hours. This would overcome all that trouble. Most museum collectors collect with

the cyanide bottle by the thousand specimens, and then spread all at once. This of course incurs the necessity of relaxing specimens and consequently the difficulty is not experienced."

On page 71 in the fourth line of the article by E. J. Smith "Taking Insects from Net," the word "hole" is a typographical error. The word should have been "fold."

HUNTING LARVÆ OF LEPIDOPTERS.

(R. R. Rowley, Superintendent of Schools, Louisiana, Mo.)

Like all other boys I studied insects in my youth, but in a desultory, destructive way, it is true. Like a Mexican Constitutionalist I was always on the firing line when a bumble bee's nest was to be attacked or a hornet's home to be bombarded and unlike a true "bushwhacker," often got in the line of the enemy's fire and had to be carried to the rear for repairs. It was only after I got into high school and took up the subject of zoology that my study of entomology began to assume some definite shape. Of course my drill was fast making a trained soldier out of me and like a modern warrior who fights from behind cover if he can find the cover, I went forth again in quest of the enemy, armed with a net and chloroform bottle. There was the most fun running pell-mell after a faded old Cybele or Monarch, striking wildly at the dodging insect only to take a battered, stringy, irre recognizable object fit only for the "rag bag."

After the skirmish line was driven in and the real siege began of course tact and caution took the place of dash and the prisoners when taken were less "shot up."

The first cocoon I ever saw to know what it was had been found by a fellow pupil but could not be bought at any price. It was a *Cecropia* cocoon, and I offered all the change I had for it. Right there began my wanderings in the woods and I've been a wanderer ever since. The coveted cocoon had been found on a sassafras bush and I stuck to the sassafras till I "landed" a prize. After nursing that cocoon all winter and jealously guarding it till the north wind had "ceased to howl," lo! one day it yielded a wasp-like insect to my utter disgust and my vision of dusky wings "had melted into viewless air." That summer I began my first searches for larvæ, big larvæ, and the first one I found was of *Polyphemus*, feeding on the leaves of an oak bush. It is likely I saw smaller "crawlers" but I passed them by with disdain. I was searching for bigger game. The finding of that *Polyphemus* larva was the second milestone on the road of my wanderings and, by the way, I've been hunting for caterpillars ever since.

All of my first study of insects was done without books or instructors. I was a close observer. I found that larvæ ate the green portions of the leaves and left the foot stalk, standing out twig-like. I also observed that the waste food of the caterpillar left the body as peculiarly grooved pellets and collected on the ground beneath where the larva was feeding. I didn't need much other instruction except the names of the foodplants of the insects I wanted.

Some of the foodplants of butterflies I learned from the butterflies themselves, as I related under "Hunting the Eggs of Lepidopters" in No. 5 of the "Butterfly Farmer." One handicap to my success as a caterpillar hunter of "rare attainments" has been my sight, a little short I think, though, the most pleasurable events of the chase, if searching for larvæ could be dignified by such a word as chase, were my first finding of larvæ of Mrs. Stratton-Porter's "Yellow

Emperor," the first "hickory-horned devil," and a full grown Modesta. I conducted thorough searches after the following manner. I would select a tree along a creek bed or the road where I could search for ordure. When I espied a pellet and determined that it was fresh I took a stand just over the spot where I found it and looked straight up. Several fresh pellets close together rarely failed to yield a "worm." Shade trees in town along the sidewalks are fine for hunting as the pellets collect on the walk. The half eaten leaves and the bare leaf stalks furnish other evidences of the presence of caterpillars. The full grown larvæ of the larger moths are usually to be found clinging, back down, to the mid-rib, leaf stalk or twig near where they have been eating, for caterpillars almost always eat at night.

If you are sure a large caterpillar is in a tree and can not sight him, climb up and use a stout club on the limbs. The jar will usually dislodge him and even chances the fall will not kill him. In fact, you do not lose many, if the fall is not too great. Sometimes even when the pellets are comparatively fresh there is no caterpillar on the tree. Doubtless he descended during the night or at early morning and is wandering beneath, in search of a suitable place to spin or burrow, or perhaps he has gathered leaves together near where you found the half eaten foliage, and is spinning a cocoon up there.

(To be continued.)

NAMES OF PURCHASERS.

The following are purchasers of eggs, pupæ or perfect specimens and pay cash for desiderata. They desire price lists. Satisfy yourself of their reliability, make your own contracts and deal with them on your own terms and at your own risk. All subscribers who are purchasers and all who have specimens for sale or exchange may advertise under this heading without charge:

Dr. William Barnes, 152 E. Prairie St., Decatur, Ill.

The Kny-Scheerer Co., 404-10 West 27th St., New York, N. Y.

Ward's Natural Science Establishment, 84-102 College Ave., Rochester, N. Y.

J. G. Duthie, editor "Canadian Thresherman and Farmer," Winnipeg, Canada.

Herman H. Brehme, 74 13th Ave., Newark, N. J.

Pattie Hutchinson, Beeville, Bee County, Texas.

William Reiff, care of Entomological Exchange, 366 Arborway, Jamaica Plain, Mass.

M. Rothke, 1957 Myrtle St., Scranton, Pa.

Fred Breitenbecker, 427 East 144th St., New York, N. Y.

Geo. P. Engelhardt, Children's Museum, The Brooklyn Institute of Arts and Sciences, Bedford Park, Brooklyn, N. Y., wants clippings or sections of food plants containing living pupæ of the Sesiidæ.

H. C. Fall, 191 Raymond Ave., Pasadena, Cal.

Fred S. Lozier, 21 Melrose St., Rochester, N. Y.

Walter Stinson, 913 Prairie St., Elkhart, Ind.

Mrs. Ellen Robertson-Miller (author of "Butterfly and Moth Book"), 1416 E. 68th St., Cleveland, Ohio.

Carl J. Drake, Ohio State University, Columbus, Ohio, Department of Zoology and Entomology. Hemiptera. Water-striders wanted for cash or exchange.

F. E. S. Bentall, The Towers, Heybridge, Essex, England.
 G. Maynard, 15 Galveston Road, East Putney, London S. W., England.
 Dr. R. Luck & B. Gehlen, Schlosstrasse 31, Berlin Steglitz, Germany.
 H. W. Head, Burniston, Nr. Scarborough, England.
 L. W. Newman, F. E. S., Bexley, Kent, England.
 Tony Matlach, V, Laurenzgasse 15, Vienna, Austria. 3 St., T. 21.
 Bertha Brauer, Lussinpiccolo, Ystrieu, Germany.
 Emil Krauth, Hebron, N. Dakota.
 W. Hogg, 79 Albert Road, Harrogate, England.
 H. W. Head, Burniston, nr. Scarborough, England.
 F. Tarniquet, 16 Rue Massol, Beziers, Heiault, France.
 Claudius Challiot, 83 Grande-Rue, Boulogne-sur-Seine, France.
 George Whittier Fuller, R. F. D. 1, "The Elms," White River Junction,

Vermont.

G. H. H. Tate, Neck Road and East 3rd St., Graves End, Brooklyn, N. Y. Larvæ of Argynnis, and Catocala ovæ.

Roswell C. Williams, Jr., 4537 Pine St., Philadelphia, Pa.

M. P. Somes, Entomologist Missouri State Fruit Experiment Station, Mountain Grove, Mo. Orthoptera.

K. Dunbar, B. E. N. A., The Manse, Downpatrick, Co. Down, Ireland, Ovæ and pupæ.

NAMES OF SELLERS.

Mrs. Florence Peace, Hale Lanakila Hone, Robello Lane, Honolulu, Hawaii, wishes names of purchasers of Dragon Flies from the Hawaiian Islands.
 Nell McMurray, 323 Locust St., Clearfield, Penn.

EXCHANGE LIST.

Dora I. Llewellyn, 1101 Addison Road, Cleveland, Ohio.

Frank Lawrence, Jr., 94 West Main St., Branford, Conn.

George Whittier Fuller, R. F. D. 1, "The Elms," White River Junction, Vt.

THE CANADIAN ENTOMOLOGIST.

A monthly Magazine Devoted to the Study of Scientific Entomology, Volume 46, begins in January, 1914. It is the oldest established magazine of the kind in America and has a world-wide circulation. Subscription, \$2 (postage paid) per annum, which includes a copy of The Annual Report of the Entomological Society of Ontario to the Legislature. Editor, Dr. E. M. Walker, Biological Department, University of Toronto, Toronto, Canada.

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ENTOMOLOGICAL NEWS.

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Lesson VII. The Care of Specimens.

RUINING PERFECT SPECIMENS.

When the beginner has a perfect specimen in the net or hatching box, a real prize specimen worth its weight in gold, the chances are about ten to one that his carelessness will prove its utter ruination. It is one thing to capture an absolutely perfect butterfly, but it is decidedly a different thing to get it to a purchaser or mounted in a cabinet in perfect condition. It may spoil its wings against the sides of the net or cage before you get it in the cyanide bottle, it may damage its plumage by its flutterings in the bottle, or by the flutterings of other flies which are piled pell-mell in the same bottle, and it will surely be badly marred by the friction of its delicate scales against the other specimens in the bottle in carrying it home if he is not exceedingly careful. He may break its legs, antennæ or wings while pinning, spreading or handling it, or in packing the papered specimen in a box for shipment without first softening it in a damp towel or sheet, or placing it in a relaxing box, or it may be crushed by rough handling in the mail bags. Finally, it may become infested with dermestides at any state of the process and be literally devoured. Any one can capture or hatch perfect butterflies, but only an expert can exercise the requisite care to get them to their destination without injury. Yet, every single step in the process is simple and safe, and there is no excuse whatever for spoiling a specimen.

THE COLLECTING BOX.

When sugaring for moths every moment of time is precious, for in a couple of hours their flight will probably cease. If you sort your catch frequently and place the perfect ones carefully in the morgue or collecting jar, they will, of course, lie perfectly still until you start home, and with due care not to shake or jostle the jar, they may be safely carried any distance. I have carried hundreds of moths in one fruit jar from the sugaring route without harming an insect. On butterfly jaunts don't trust this method. Sort your flies frequently and either pin or paper all cabinet specimens and place them in what is usually termed a collecting box. This may be an ordinary empty cigar box if you put the flies in papers, or may be cork-lined if you pin them, or it may be an elaborate metal-lined affair with receptacles for cyanide and delicate springs to gently hold the papers in place. If possible have the best paraphernalia, but in an emergency use what comes to your hand.

PINNING THE COLLECTION.

Some collectors carry a cigar box lined with sheet-cork and an assortment of entomological pins, and as soon as the flies are dead they are pinned in the box. Pins may be conveniently carried in short homeopathic vials each labeled with the number of the pin it contains. No. 1 should be used for very small flies, 2 and 3 for the majority of insects and larger numbers for the largest specimens. Small pins bend easily and cause great annoyance, but very small specimens should not be impaled upon large pins. No matter how brisk the collecting is, sort your specimens frequently and pin the perfect ones in the box

before they have suffered injury. Ordinarily place the pin through the thorax, the point entering in the middle of the back and coming out underneath the insect so that the wings of the specimen will be at right angles with the pin. Insert the pins firmly into the cork so they cannot jar loose. Carry the collecting box in a pocket, a satchel or collecting bag swung over the shoulder by a strap, or in an ordinary game bag or the compartment of a hunting coat. If you are taking many perfect butterflies and fear the cigar box will not hold them all several flies may be temporarily impaled, one above the other, upon a single pin, by thrusting the pin through the sides of the thorax under the wings. In this method of pinning the side of the butterfly is uppermost, the wings folded over the back, and one pin may contain half a dozen flies pinned one above the other. By this method a far greater number of specimens may be pinned in a given box.

PAPERING SPECIMENS.

James E. Cottle, 2214 Webster St., San Francisco, is a learned Entomologist and one of the most expert collectors on the Pacific Coast. He places every perfect specimen, as soon as it is unconscious, in a three-cornered paper envelope made of druggist's wrapping paper. He always carries a pocketful of envelopes, ready for instant use, even though he has no net and is not on a collecting tour. Seeing a butterfly sitting upon a flower, with a quick darting motion of his thumb and finger he will grasp its body at the base of the wings, give it exactly the right squeeze to kill it, place it in an envelope, drop it in a coat pocket and go on his way. I have watched him do this or I would not believe it possible. He is a noted detective, but catches butterflies while catching criminals. He taught me to paper all perfect specimens as I took them from the cyanide jar at each sorting. Once in an envelope with its wings folded over its back a perfect insect may be safely carried home in almost any sort of a collecting box. The sides of the envelope and its folded edges form a perfect protection even if the box contains many such envelopes. Dried specimens are as brittle as spun glass and papers containing them must be handled cautiously, but the freshly captured butterfly does not become dry or brittle for a few hours. The date, locality and name may be penciled on the flap of the envelope, and upon arriving home these envelopes may be stored away ready for shipment. If necessary I pin the freshly caught specimens in cork-lined boxes, but I much prefer placing them in papers when first caught. Crystals or a cake of cyanide of potassium should be fastened in the collecting box, whether you use pins or papers, to prevent the resuscitation of the butterfly.

THE DUKES COLLECTING BOX.

To illustrate the extreme care which the experienced collector uses to preserve perfect specimens from injury during collecting jaunts, let me briefly describe the collecting box employed by W. C. Dukes, 311 So. Georgia Ave., Mobile, Alabama: It is a wooden box with a slide cover of any convenient size. He says: "The last one I used was one which had contained shoe polish, but I formerly used a crayon box. In the bottom of this box I first put a piece of velveteen or canton flannel, pile uppermost; next a piece of oiled paper, then a layer of papered specimens, then another piece of oiled paper and a piece of velveteen or canton, pile down. Above this I place another piece of velveteen, another of oiled paper, another layer of specimens covered as before with oiled paper and velveteen with pile or nap downward. The oiled

paper is like that which comes around Uneeda crackers and the like. Have as many of these layers as may be necessary until the box is filled. To hold the layers in place and exert a gentle pressure upon them from the outset I place in the box a thin board as a sort of false cover, which moves freely up and down inside the box. Attached to the upper part of this sliding board or false cover is a thin steel band about half an inch wide (mine came from an old clock,) bent upward in the form of a bow, with one end firmly attached to the board by means of a tack or screw. As the cover slides in place it presses against the upper part of this bowed spring and forces the false cover down upon the layer." Mr. Dukes uses this box in collecting Coleoptera, but it is an absolutely perfect way of carrying Lepidoptera. The box may even be dropped without injuring the specimens. All the layers may not be used or required each trip, but are in readiness in case they are required. This box he carries with a shawl strap or piece of elastic.

MR. COTTLE'S METHOD.

Mr. Cottle does not use a cyanide bottle when collecting, but employs instead a metallic-lined wooden box with a sliding glass cover. In the center of the box or at the end is a compartment with gauze-like perforations which contains the cyanide. When taking insects from the net the sliding cover may be opened a little way for a small fly or fully drawn back for a large specimen, and in either case the cover can be instantly pushed over the opening while the box is still in the net. The open-mouthed cyanide bottle is far clumsier and must generally be taken out of the net before the cork can be inserted or the cap screwed in place. Some of Mr. Cottle's boxes have a partition in the middle and a compartment for papered specimens. His principal collecting box is made of metal, zinc I think, contains a compartment for cyanide and has a false or sliding cover which exerts a gentle pressure upon the papered specimens which prevents them from jostling or jarring. I have never possessed anything like so perfect an outfit, but fully appreciate its advantages. Excellent results, however, may be obtained from simple, home-made collecting boxes. If those who are financially able take elaborate pains to insure the safety of the perfect specimens which they capture surely the beginner must do everything in his power to protect his butterflies from injury. Do not begrudge the time or labor, or care which are necessary to guard your catch against the shakings, the shocks and accidental jarings which threaten it during your rambles. Whatever you do never allow butterflies to be piled together indiscriminately in a cyanide jar. At the very least, paper your specimens and place them carefully in a separate cyanide jar. Very good collecting boxes can be reasonably purchased from the supply houses.

THE PAPER ENVELOPES.

Over and over I must reiterate that the beginner is apt to worry because he cannot do each particular thing in a prescribed manner. An author recommends his favorite way of doing this or that, but another author would suggest an entirely different method. In the matter of papering specimens one collector would insist that it is best to purchase the coin or pay check envelopes which druggists use. They are of different sizes but one $2\frac{1}{2} \times 3$ inches will accommodate all the smaller species. These envelopes are very cheap and are really very neat. Holland's Butterfly Book suggests taking a piece of paper whose length is half an inch longer than the width, bringing a corner to within a quarter

of an inch of the opposite corner and letting it project a quarter of an inch beyond the opposite side of the paper. When these projecting sides are folded the envelope is complete. I prefer taking a square piece of paper, folding the opposite corners together, folding the edges of one side, and after the fly is placed in the envelope, folding the edges of the other side, thus sealing the three-cornered envelope. I purchase druggist's wrapping paper by the ream, take it to the printing office and have it cut into squares of different sizes, say 3x3 inches, 4x4 inches, 5x5 inches, etc., cutting the squares to the best advantage according to the size of the sheet. Placing each size in a separate box, I fold a great many envelopes in my spare moments, and with a needle and thread string them together in lots of about one hundred. A small knot in the end of the thread allows you to pull one off whenever it is needed. Tissue paper is not good because it is not thick enough to afford any protection to the butterfly or its appendages if the paper is accidentally bent. Very heavy paper is so stiff and hard that it may spoil a delicate butterfly because it is so inelastic. A good quality of ordinary newspaper is highly recommended and ordinary writing paper is not bad. Printed newspaper, in a moist atmosphere, may communicate its ink to the specimen. Cut an ordinary envelope in two and each half will hold a specimen.

PRESERVING A COLLECTION.

The object of this lesson is to impress upon the mind of the beginner that the preservation of specimens is of even greater importance than their acquisition. Keep your collection in close fitting boxes, drawers or cabinets which are permeated with the odor of naphtha or any other good insecticide and your butterflies and moths will be perfect for untold years. Schmitt boxes and cabinets are best and in the long run are cheapest, but home-made cabinets and drawers can be made safe and serviceable. Cigar boxes have been urged simply from an economical standpoint and if kept in tight chests, cupboards or closets will last several lifetimes. I have cigar boxes of perfect specimens over forty years old from my father's collection. Light fades the hues of all butterflies and ruins delicate colorings. Expose specimens to light as little as possible. Constantly guard against dermestids, dust, light, heat, dampness. Keep your collection in cool, dry, dark, dust-proof, insect-proof boxes and drawers and the brilliancy and freshness of the specimens will not be impaired in a thousand years. Endeavor to retain at least one pair of absolutely perfect examples of each species of your locality and you will soon have a collection that is of value to science. Whenever you suspect dermestids, a little chloroform, gasoline, formalin or other good disinfectant poured in the bottom of the boxes will destroy the pests.

NAMING AND LABELING.

During the busy collecting season your greatest care is to get your output pinned or papered in boxes. I use ordinary cigar boxes which the newsboys in San Francisco collect for one cent each from the cigar stands. Last season's catch, together with the bred specimens, required 500 cigar boxes. At the close of the season I sort the species and send perfect samples of each to Dr. Barnes for determination. When the list of correct names is returned every specimen must have attached proper date and locality labels. Charles V. Blackburn, 12 Pine Street, Stoneham, Mass., prints my labels in diamond type and gives perfect satisfaction, though doubtless many printers would do as well. If you write Mr. Blackburn he will send you a full line of samples. Your name, the locality and the exact date when the insect was caught or hatched should be pinned beneath the specimen.

During the collecting season this data may be penciled on the cigar box containing each day's catch, but the labels must be attached to each insect when the specimens are removed from the box. Unless a species is exceedingly rare, there is no excuse for retaining a damaged moth or butterfly. If you discover a nick in the wings, the loss of an antenna or leg, or any imperfection whatever, mercilessly discard the specimen as worthless. Each specimen should bear the proper sex label. The sign ♂ (Mars) is used for the male, and ♀ (Venus) for the female and ♀ for the workers or neuters. Pin the label through the middle a short distance below the specimen so as not to interfere with the legs. With butterflies and moths the labels should extend with the wings, but the rule with other insects is to have it extend lengthwise with the body. The specimen is far more valuable if it bears a label stating whether it was captured at light, at sugar or on a designated flower. Of course, labels may be written, but it is not expensive and is far more convenient to have them printed.

INSECT PESTS.

Insect or museum pests are to be constantly dreaded. Unless you exercise constant vigilance your boxes or cabinet will become infested with small beetles or other insects, which will destroy your specimens. The first hint of their presence is usually a fine dust on the bottom of the box around the pin which contains the infected specimen. Cigar boxes should be kept closed with a little brass clasp. I know of no one who sells them except Herman Goetz, 341 Kearny Street, San Francisco, and the cost is \$3.00 per 1000. They are fastened to the box by the small wire brad used in making cigar boxes. Keep boxes, drawers and cabinets sprinkled with naphthalene flakes, or, better still, use the naphthalene cones advertised by supply houses. Heat the head of a pin in the flame of an alcohol lamp and with a pair of forceps thrust it into a moth ball and it will answer the purpose of the naphthalene cone. If you prefer, wrap the moth ball in mosquito bar, cheese cloth or gauze and pin it in the corner of the box. Creosote, camphor gum, oil of lavender, carbolic acid, or formalin will keep out pests. When you receive a shipment of insects, or when you discover dermestidæ in your collection it is well to place the insects in a close receptacle containing a little formalin for a few days. A quicker, surer method of exterminating pests is to immerse the specimens in a bath of gasoline. Spraying gasoline from an atomizer upon pinned specimens will destroy pests and not injure or relax the specimen. In shipping insects it is wise to sprinkle the boxes with naphthalene flakes to prevent infection en route. When I receive papered specimens I invariably place them in a can of gasoline over night. Some insects, especially large moths, will become greasy from the fat which they contain. Gasoline will remove grease if the specimen is soaked in it two or three days. Gasoline and the fumes of formalin rob the museum pest of half his terrors. Use them freely the moment you suspect danger.

N. B.—TO ENABLE ME TO GIVE MY PERSONAL INSTRUCTION BY LETTER TO EACH PUPIL THE CORRESPONDENCE COURSE WILL BE LIMITED. ONLY A SMALL EDITION OF "THE BUTTERFLY FARMER" IS PUBLISHED, AND, ALL SUBSCRIPTIONS DURING THE YEAR WILL BEGIN WITH VOL. I, NO. 1.

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THE BUTTERFLY FARMER

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AMATEUR ENTOMOLOGISTS



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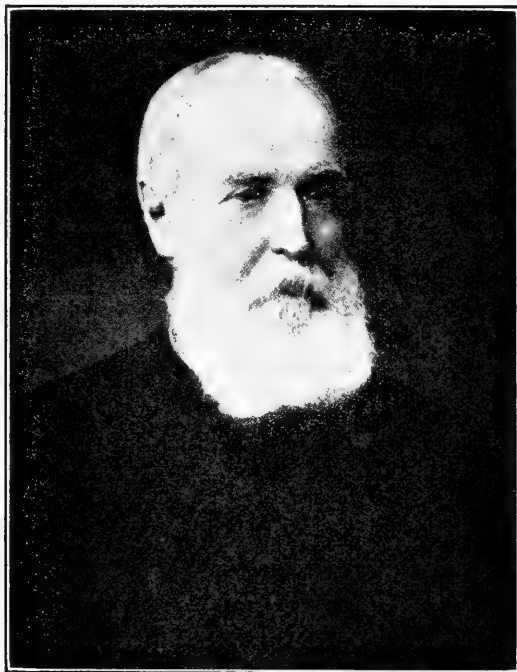
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THE REV. CHARLES JAMES STEWART BETHUNE.

We are glad to publish a portrait of the President of the Entomological Society of America, the Rev. Charles James Stewart Bethune, M. A., D. C. L., F. R. S. C. Dr. Bethune was born at West Flamboro, Ont., August 11, 1838, and is therefore in his 76th year. He is hale, hearty, upright, and his life is full of usefulness. He has been identified with the Entomological Society of Canada since its organization in April, 1863. Two of the founders, himself and Dr. Wm. Saunders, are still connected with the Society, and Dr. Bethune was elected its Jubilee President last year. He was the editor of the Canadian Entomologist at its birth in 1868 and during the five succeeding years. His friend, Dr. William Saunders, edited the magazine for the next thirteen years, and Dr. Bethune was its editor during the next twenty-three years. He



REV. CHARLES J. S. BETHUNE.

retired from active editorial work in 1910, but was appointed Editor Emeritus of the Canadian Entomologist by the Executive of the Entomological Society of Ontario, which honorable position he still fills.

Dr. Bethune has a world-wide reputation as a learned Entomologist and has perhaps wielded a greater influence than any other scientist for the upbuilding of entomological work in America. I am glad to publish his portrait as a slight tribute of gratitude to him for the personal kindnesses and courtesies he has shown me and for those which he extended to my Father forty years ago. I honor him for his life of great achievements, but I especially desire to attest the fact that during all his life he has always been ready to lend a helping hand to a beginner in entomology.

INCREASING DEMAND FOR COCOONS.

The Butterfly Farmer is pleased to report an unprecedented demand for cocoons this winter. We have advocated that the prices of live pupæ of *Lepidoptera* should be reduced and our subscribers have tried the experiment with good success. Far more orders have been received than we have known how to fill and these orders have come from all parts of America and Europe. The ease and safety with which cocoons may be shipped, the untiring pleasure of watching the adults emerge and develop their wings, and the fact that they yield perfect cabinet specimens will always render the cocoon a valuable product of the butterfly farm. If prices are reasonable an almost unlimited supply of live pupæ can be sold each year, especially of species which hibernate in the pupal state. We would esteem it a favor if all correspondents would notify us of the probable number of each kind of pupæ which they can furnish next winter.

TROUBLES OF EARLY COLLECTORS.

By Dr. Richard E. Kunze, Phoenix, Arizona.

"I have looked over your Farmer and notice many very interesting items; likewise read the names of some old friends of mine from the East and West, and their pleasing comments on your good work in behalf of Entomology. I, too, trust that you will make many converts to this natural science. The American public on this point needs to be more thoroughly educated.

"For instance, when the late Dr. Hulst of Brooklyn, twenty-six years ago came to Prescott, Arizona, to find *Sphinx elsa* and other varieties, he went camping ten miles north of Prescott on the Hassayampa river and location of the old Senator gold mine. He found it impossible to get board or lodging at the miners' boarding house, the only place there to be found. The miners adjudged him insane, and refused him to be lodged in their company. Finally he found an independent miner up on the mountain, named David Grubb, from Ohio, a better read man, who took pity on the Clergyman and gave him board and accommodation such as pioneer miners can provide. When I came to Prescott in 1896, I made several trips to the Senator mining camp and a few times stopped with Mr. Grubb, because his one-room shanty was located on the stage road between Senator and the Crown King mining camp. Mine host often talked with me about Dr. Hulst.

"Similarly, but less exasperating, was my own case, when in 1899 or 1900 I stopped in Globe, that great copper camp at the foot of the Pinal Mountains, 100 miles east of Phoenix. Until I could find a conveyance to take me up to the Pinal Mountains, a distance of only fifteen miles, I passed evenings in front of the gambling houses and saloon, on the long strung-out and only street, beside the precipitous creek, to take a few nocturnal insects with my cyanide bottle. The little bewildered tenants of those buildings discussed matters hastily and thought advisable to have me arrested and examined regarding my sanity! Fortunately, the electrician of that plant knew me, because he had seen me doing the same thing in Phoenix previously, and nipped the scheme right in the bud. Right here I would state that the only insect of importance of those mountains was the very rare *Cychrus snowii*, a beetle, of which I only took six specimens."

There was never a Queen like Balkis,
From here to the wide-world's end;
But Balkis talked to a butterfly
As you would talk to a friend.

—Kipling.

HUNTING LARVÆ OF LEPIDOPTERS. (Continued)

(R. R. Rowley, Superintendent of Schools, Louisiana, Mo.)

As stated in my first article, one will have more success searching for larvæ of butterflies and many moths, on tender young sprouts. I once took two of the finest "hickory-horned-devils" on a walnut bush hardly eight feet high.

While larvæ should be sought on the under side of the foliage or twigs, yet the "hatchings" of many species, especially of *Papilios*, remain on the top side till after the first and, sometimes, second moult. The little caterpillars of *Ajax* are black when feeding on the top side and those of *Cresphontes* and *Turnus* are hardly lighter. The grown larvæ of *Popilio troilus* rest in silken lined curled leaves of sassafras. Learn the foodplants of the moth or butterfly you are anxious to secure and search every bush or tree till you find what you are looking for. Of course, the time of year must be correct. June, August and September are the best months.

The most interesting larvæ collecting is that of hawk moth caterpillars and, some years, most of the species are plentiful and so are their parasitic enemies. I "used" to wish I could annihilate the parasites of larvæ. You happen on a rare worm and gather him in tenderly and for a week he is treated to the tenderest of "greens," when lo! he falls sick and "breaks out with parasites," not measles. There's no use to call in a doctor, that worm is about ready for the undertaker. What pain a poor caterpillar must suffer when scores of little hymenopterous larvæ bore their way out through his body to the surface!

Once when I had been down the brook on the lookout for June butterflies, I discovered a full grown hawk larva on a blackhaw sprout. I didn't know anything fed on blackhaw and while I knew at once that my find was *Everyx*, I tried hard to think it was *versicolor*, although I knew the foodplant of the latter was said to be buttonbush. It was late in the afternoon and I failed to find others, though I made a short search, and, so, after cutting some food sprays for the captive and "tucking away" in my hat (food leaves or small twigs can be carried half a day or longer in the hat on the head if first thoroughly wet), I wended my way homeward with my mind full of "parti-colored hawks." Next day that treasure worm had the breaking out and so perished miserably. Fortunately, later I found enough of the same worms to get an imago or two and saw the first bred specimens of *Everyx choerilus*. While gathering the choerilus larvæ I found caterpillars of *Hemaris thysbe* on the same sprouts. Later I found both of these on snowball.

Many of my good finds were accidental. While looking for larvæ of *Apatura celtis* and clyton on hackberry I happened on the caterpillars of *Libythea bachmanii*.

Grape and woodbine yield larvæ of *Philampelus achemon*, and *pandorus*, *Everyx myron*, *Deidamia inscripta*, *Amphion nessus*, *Thyreus abbotii*, besides the "eight spotted forester," *Psychomorpha epimenis* and other good things. Plum, apple, wildcherry, crab, honey locust, lead plant, hazel, walnut, elm, wild indigo, in fact almost every available plant will give you many genuine surprises. Some larvæ, as those of *Anæa andria*, *Alypia octomaculata*, the beautiful *Psychomorpha epimenis*, *Papilio turnus*, *troilus* and *philenor spin* retreats on the top sides of leaves and infolding the edges of the leaf. The little autumn larvæ of *Limenitis ursula* and *disippus* make winter retreats or hibernacula inside small willow and poplar leaves and may be found throughout the winter, as they are fastened to the twig much as a cocoon of *Promethea* or *Polyphemus*. The larvæ of *Amæa andria* to the time of the second moult take refuge on a slender thread-like perch built out of chewed up leaf and refuse

matter and fastened usually to the end of the leaf mid rib, but occasionally to the side of the blade.

A few years ago while wandering along the rocky bottom of a little woodland brooklet, I noticed some tell-tale pellets of larval ordure beneath a little butternut tree. I soon located a larva of *Citheronia regalis*. Other small trees, for none of them had a trunk diameter of six inches, gave other "worms." The weak slender branches forbade climbing other than upward and rather than risk jarring down such great caterpillars, I left the rest for another day. Next day, armed with a small saw and sharp hatchet, I sawed off long limbs and cut down small trees and left the woods laden with spoils, caterpillars of *Regalis*, *Luna* and *Cressonia juglandis*.

The larvæ of *Catocalæ* hide under the loose bark of hickory, in the grooves of walnut and oak bark, under the leaves of climbing plants that lie against the tree trunk, at the bottom of the trunk of the foodplant concealed by the grass, under leaves on the ground or other loose objects. Noticing their means of concealment, led the writer to trap for these caterpillars. Loose wads of paper at the bottoms of the trees, holes made by pushing the finger or stick down, two or three inches, into the ground against the tree trunk and loose double or treble shingles leaned against the tree, make satisfactory snares. In the latter case the caterpillars crawl between the shingles after eating at night, and rest there in the day time.

ANNOUNCEMENT—SUMMER CLASS.

During the months of June, July and August, 1914, I will give personal instruction in butterfly farming to a limited class of pupils at Truckee, California. Those interested will write for particulars. (Editor Butterfly Farmer).

THE COLLECTOR'S WORK.

(Editorial, Bulletin Brooklyn Entomological Society.)

The collectors of insects in the United States during the past twenty years number high into the tens of thousands. Ninety-five per cent. of them date the beginning of their interest from the admiration of a butterfly, and from this have progressed to the observation of color differences of many butterflies and moths. The primary motive is getting together pretty things. Two-thirds, however, of beginners never progress beyond that stage. Of the few who keep on passing to other insects ninety-five per cent. become interested in the limitless range of color, size and form of the race of beetles. Beyond this not one in a hundred proceeds.

In almost every sizeable town in the land there is at least one person who has pinned and kept some sort of insect collection until neglect or dermestids dispose of it. In the aggregate such collections have been of vast value, for the comprehensive student can get from each of them a general grasp on the fauna of that particular region, which would otherwise take a season of careful search, and has gotten, also, thousands of additions to the taxonomic catalogue. Heaven bless the patient country collector, even though he (or she) knows little about the subject, especially if he dates and otherwise defines what he has.

On the other hand, a collector of specimens is not necessarily an observer of nature. It is the rule, not the exception, that the collector of a box of beetles divides them by name, or, more simply, if he cannot get names, by color, and can tell almost nothing about the life cycle, habits or food of a single one. He is no more a scientist than the collector of cancelled revenue stamps, post

marks or cigarette pictures. His results are of the minimum value to the world.

"Any addition to the sum total of human knowledge, however slight, is the greatest achievement open to a scholar," said Professor E. P. Morris, of Yale University. Who is to be the judge of its importance? No one has such right. An addition to human knowledge! It is the prize, the aim, the result to be proud of. No one has the right to belittle it because of its failure to be of any economic value whatever. Twenty thousand insects are enumerated in the catalogues and dismissed summarily as "of no economic importance." Nevertheless, the man who should discover a spur on the hind leg of a minute "bug," the most insignificant creature on the faunal list, and who should find out what its function is in the creature's existence, why evolved, has accomplished more to be proud of than his fellow who has correctly named and aesthetically spread 5,000 specimens. The discovery and description of any instinct, habit, peculiarity of structure, phase of life or death, in the least of living creatures, stands high in the category of desiderata for addition to the sum total of human knowledge.



CYCHRUS VENTRICOSUS DEJ.

Rensselaer J. Smith, M. D., Milpitas, Cal.

Family, Carabidæ (the Ground beetles). The Sub-family, Cychrini, has two genera, *Cychrus* and *Nomaretus*.

Specimen size 20 m.m., cut enlarged to 31 m.m.

The *Cychrus* may be recognized by the long narrow head, circular wing covers with a broad reflect margin. Their color is black violaceous or brownish-purple. Some are very beautiful. The elytra have fourteen to eighteen very distinct striæ (parallel, fine impressed lines). Antennæ with four basal joints glabrous. The *Nomaretus* has only two of the basal joints glabrous. They are found in moist locations, under stones, leaves, stumps, etc. They feed on snails. We have about forty species in the United States.

Learn early to examine all specimens with a microscope or common mag-

nifying glass. There are three forms used by Entomologists, not speaking of the compound microscope. First a simple lens, called by various names according to its use, as reading glass, retouching lens, etc. Second, a glass such as jewelers put over one eye. Third, a photographer's retouching hood. This device consists of an aluminum hood in which two lenses are set so as to form a single magnifying glass. It relieves the constant strain on the worker's eyes, leaves both hands free, is inexpensive, can be procured of any dealer in photo supplies.

THE DRAGON FLY.

By W. Hogg, B. E. N. A., 79 Albert Road, Harrogate, England.

There is no fly which has the marked and distinctive peculiarity of a dual existence as the above-named. In its larval condition it can no more exist out of the water than a human being can beneath its surface, whilst in its mature condition it must have air, and placing it in water would terminate its existence. Perhaps it will be interesting to follow it through its varied stages. *En passant*, we may assume that it receives its name from the voracity of its appetite, and from its powerful jaws, which it possesses in both stages of its life. The largest part of this is spent as an aquatic insect, and a short period in the air, but whether it be terrestrial or aquatic it is equally ferocious. The eggs are deposited in the late autumn in the water, and are there hatched. It is a peculiar looking insect in its embryo state, about $1\frac{1}{2}$ inches in length when nearly full grown, with an upraised tail, the whole being pale greyish brown in colour. If two or more are placed in a bottle, and insect life is not at hand, the strongest will turn cannibal and feed upon his weaker brethren. It may be noted here that the writer has placed flies upon slow running streams, and noticed that so long as the insect was quiescent, it floated slowly along, but directly it began to struggle it fell a victim to a fish or a dragonfly larvæ. For some time the subject of our chat remains in its winter quarters, waging war on all the aquatic denizens of the pool, but as the middle of summer approaches it becomes languid in its movements, cares less and less for food, and at last ceases to eat altogether. Meanwhile, a wonderful change has taken place in its breathing organs; it fails to extract oxygen from the water, and must breathe the air or it will die. It makes its way to any object projecting or growing out of the water. This it slowly ascends, for its legs are stiffening, and at last it reaches a suitable height, where it awaits its escape from its aquatic life. The skin rapidly dries in the sun, and the insect in its struggles for breath splits it along the back, and it inhales the air it has longed for. New strength comes rapidly, and the insect soon withdraws its head, the legs follow and assist the rest of the body to be withdrawn as from a sheath, whilst the empty shell is left clinging to the plant or projection which the pupa had climbed. So complete is this that the writer has seen them removed and brought home by naturalists. When thus released, the dragon fly is helpless, and the wings hang limp and without beauty, but possessing air, at every respiration this is forced into them, so as to gradually loosen the folds into which they have been packed. If the sun be warm, both pairs are soon open to their full dimensions, and the dragon fly darts off in pursuit of food. Its voracity is unequalled. A large butterfly is quickly disposed of, and the dragon fly crunches up the body of its victim in its powerful maws, and though the wings are generally discarded, a part of them will sometimes follow the body into the dragon fly's insatiable stomach. The Rev. J. G. Wood, M. A., commenting on the dragon fly appetite, says: "A lion cannot compare with the dragon fly in point of voracity. Suppose that any one were to assert that a

lion had eaten 30 ducks and four or five geese, without pausing, we should say he was taxing our credulity by relating a feat the animal could not perform. But suppose he were to add that the lion, after being cut asunder, did not die, but ate the severed lower portion of his body, we should be disposed to set down the narrator as a madman. Yet this is just what a dragon fly has done, flies being substituted for fowls, and large garden spiders for geese. The insect, when accidentally struck asunder, has been known to eat the whole of its own abdomen, when presented to it, and any other dragon flies would probably act in a similar manner." But to return to our subject. This fierce terrestrial life is a short one, however. It depends on the food supply, and may be counted by weeks, for when insect life begins to fail, as autumn with her shortening days and cooler evenings, it soon ends its career. Drawn by yet another instinct, it returns to its former habitat, the water, lays its eggs, and dies.

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Lesson VIII. Prices of Lepidoptera.

AN IMPORTANT QUESTION.

"What price shall I charge for my moths and butterflies?" This question bobs up so persistently, so frequently and is so very important that it may as well be touched in this as in a later lesson. Please note that I say "touched" instead of "answered." As a matter of fact each pupil must answer this question for himself, taking into consideration his locality, the material he can offer, his environments and necessities. Collectors have always made their own prices or have allowed the dealers to make them. To be exact, the dealer generally requires all the different collectors to name prices and then purchases of the one who makes the lowest bid. There is nothing novel in this. It is a rule which prevails in all kind of business. The seller asks as much and the buyer pays as little as possible.

THE ORDINARY METHOD.

If you wish to follow in the beaten track and do as other collectors have always done you will prepare a printed or typewritten list of what you have to offer, naming the price of each species. This you will send to all the dealers and purchasers whose names you can obtain. It will pay you to advertise your list in any or all of the entomological journals. In this manner you will reach a vast number of museums, scientists, dealers, collectors, amateurs and lovers of nature who will write you if you have things which they need, and if your prices are satisfactory. You will, of course, be prepared to fill orders for single specimens or "singles" as they are termed, unless you expressly state in your advertisement some limit as to the size of the orders you will accept. If your prices are quite low or your species quite desirable you will soon find a customer who will purchase the greater part of your output.

PUBLISHED PRICE-LISTS.

As heretofore mentioned (see page 12), Ward's Natural Science Establishment publishes a price-list of moths and butterflies. Each pupil should obtain this list, as it shows what is considered a fair valuation for each specimen. Since orders are received for single specimens, the prices named are not unreasonable. It is doubtful if any one could fill orders for singles at a less figure. European houses publish price-lists and their quotations agree fairly well with Ward's. When a purchaser desires only one or at most a pair of a given species, the bother of filling these small orders justifies almost any price. There has been no reduction in prices worth mentioning during the last half century and it is

very expensive to establish and maintain a good collection of lepidoptera. I have not heard that any changes are contemplated and presume that one would be considered revolutionary, or at least visionary, who would suggest any changes in the old-time methods.

COLLECTIONS EXPENSIVE LUXURIES.

Only very wealthy men, very wealthy institutions or museums munificently endowed by millionaires or governments can hope to possess large collections of moths and butterflies. Individual collectors with moderate means can only hope to build up their collections by a system of exchanging, one with the other, and the business of exchanging specimens has assumed vast proportions. Indeed, more than one well known Entomologist has expressed surprise that anybody could be found who would purchase specimens. It has become a rule among the middle classes to acquire additions to their collections by means of exchanging. Occasionally every collector will buy a rare specimen to fill up a gap in his cabinet, but the tendency of the extortionate prices of specimens has been to drive every one of moderate means into the business of exchanging instead of buying and selling. No one has suffered more than the dealers themselves, for only men of large capital could afford the luxury of owning collections, and such men can afford to employ their own corps of collectors.

NEW INTEREST IN ENTOMOLOGY.

There is a new and very widespread enthusiasm in the study of entomology. Schools, colleges, the Agassiz Association, nature clubs, writers of fiction and even the newspapers and magazines are trying to educate people to study this fascinating branch of science. Of course, each neophyte will not become a devotee, each curiosity seeker a worshiper, each amateur a scientist, but the outgrowth of the present education will be a vast number of zealous entomologists and enthusiastic collectors. One can almost claim that a "butterfly" fad is sweeping over the country. Butterfly jewelry, plaques, art work, artistic mounts, pictures, decorations, displays in show windows are quite common and are constantly increasing. The craze has invaded the world of fashion and butterfly designs abound in all sorts of embroidery and fancy work. Many boys and girls, many young women and men are becoming entranced with the sport of catching moths, butterflies and beetles, and of starting collections for their own amusement and the entertainment of their friends. They cannot afford to buy specimens at the prices charged by the dealers. Those who propagate moths and butterflies will soon learn that good money can be made by selling at lower figures.

GOOD PROFITS AT LOW PRICES.

If the scores and hundreds of people who are learning butterfly farming can sell the products of their nets, traps and breeding cages at a flat rate of five cents per specimen, they will not only find their avocation profitable, but they will enable people of moderate means to build up fine collections. I shall not attempt to advise pupils what prices they ought to charge for specimens, because each particular locality may require a different schedule. In corresponding with my pupils I find that many of them are willing to make about the same terms which I here announce for the butterflies and moths of Truckee. The list submitted is only a partial one of the species which are found in this locality. Additions and corrections will be made from time to time, but this list will form the basis of my offer.

LIST OF TRUCKEE BUTTERFLIES.

(Numbers, first column, Holland's "The Butterfly Book," "The Moth Book"; second, "Dyar's List of North American Lepidoptera." Dyar's nomenclature used.)

Holland	Dyar	
305	1	<i>Parnassius clodius</i> Men. a. <i>menetriesii</i> Hy. Edw. b. <i>altaurus</i> Dyar
306	2	<i>smintheus</i> Db. & Hew. a. <i>behrii</i> Edw.
310	8	<i>Papilio daunus</i> Bd.
308	9	<i>eurymedon</i> Bd.
312	18	<i>zolicaon</i> Bd.
312	20	<i>indra</i> Reak.
275	28	<i>Neophasia menapia</i> Feld.
277	33	<i>Pontia beckeri</i> Edw.
278	34	<i>sisymbri</i> Bd.
278	36	<i>occidentalis</i> Reak.
279	38	<i>napi</i> Linn. c. <i>venosa</i> Scud. i. <i>pallida</i> Scud.
280	40	<i>rapæ</i> Linn.
283	44	<i>Synchlœ ausonides</i> Bd.
285	46	<i>lanceolata</i> Bd.
282	49	<i>sara</i> Bd. a. <i>reakirtii</i> Edw. b. <i>julia</i> Edw.
290	65	<i>Eurymus eurytheme</i> Bd.
105	98	<i>Argynnis leto</i> Behr.
114	110	<i>monticola</i> Behr. a. <i>purpurascens</i> Hy. Edw.
117	115	<i>coronis</i> Behr.
118	118	<i>nevadensis</i> Edw.
126	129	<i>montivaga</i> Behr.
126	130	<i>egleis</i> Bd.
135	142	<i>Brenthis epithore</i> Bd.
140	149	<i>Lemonias mcglashani</i> Riv.
140	151	<i>ancia</i> Db. & Hew.
142	159	<i>editha</i> Bd.
143	164	<i>palla</i> Bd.
143	165	<i>whitneyi</i> Behr.
143	166	<i>hoffmanni</i> Behr.
154	191	<i>Phyciodes pratensis</i> Behr.
156	195	<i>montana</i> Behr.
166	211	<i>Polygonia zephyrus</i> Edw.
168	216	<i>Eugonia californica</i> Bd.
169	217	<i>Euvanessa antiopa</i> Linn.
169	218	<i>Aglais milberti</i> Godt.

Holland	Dyar	
170	219	<i>Vanessa atalanta</i> Linn.
170	220	<i>huntera</i> Fab.
170	221	<i>cardui</i> Linn.
170	222	<i>carye</i> Hub.
173	223	<i>Junonia coenia</i> Hub.
185	242	<i>Basilarchia lorquini</i> Bd.
187	243	<i>Limenitis bredowii</i> Hub.
		a. <i>californica</i> Butl.
215	258	<i>Cercyonis alope</i> Fab.
		c. <i>nephele</i> Kirby.
		d. <i>baroni</i> Edw.
217	262	<i>paulus</i> Edw.
217	263	<i>sylvestris</i> Edw.
218	264	<i>cetus</i> Bd.
222	291	<i>O-eneis chryxus</i> Db. & Hew.
		b. <i>ivalda</i> Mead.
82	308	<i>Anosia plexippus</i> Linn.
238	327	<i>Habrodias grunus</i> Bd.
	340	<i>Thecla californica</i> Edw.
	343	<i>dryope</i> Edw.
244	354	<i>sæpium</i> Bd.
245	355	<i>nelsonii</i> Bd.
247	370	<i>Callipsyche behrii</i> Edw.
	372	<i>Incisalia iroides</i> Bd.
248	377	<i>eryphon</i> Bd.
249	378	<i>niphon</i> Hub.
249	380	<i>Callophrys dumetorum</i> Bd.
252	387	<i>Tharsalea virginensis</i> Edw.
253	391	<i>Gæides editha</i> Mead.
253	392	<i>gorgon</i> Bd.
254	394	<i>Epidemia mariposa</i> Reak.
	395	<i>zeroe</i> Bd.
254	396	<i>helloides</i> Bd.
	400	<i>Chalceria cupreus</i> Edw.
258	403	<i>Satyrium fuliginosa</i> Edw.
259	404	<i>Cupido heteronea</i> Bd.
259	407	<i>fulla</i> Edw.
260	408	<i>icarioides</i> Bd.
260	409	<i>sæpiolus</i> Bd.
261	418	<i>Nomiades antiacis</i> Bd.
262	420	<i>lygdamas</i> Doub.
		a. <i>oro</i> Scud.
262	421	<i>Phædrotes sagittigera</i> Feld.
263	424	<i>Agriades podarce</i> Feld.
264	427	<i>Rusticus enoptes</i> Bd.
265	430	<i>shasta</i> Edw.
266	434	<i>acmon</i> Db. & Hew.
	437	<i>anna</i> Edw.
268	441	<i>Cyaniris ladon</i> Cram.
		g. <i>piasus</i> Bd.

Holland	Dyar	
347	487	<i>Erynnis comma</i> Linn. e. nevada Scud. l. manitoba Scud.
349	507	<i>Anthomaster sylvanoides</i> Bd.
	508	agricola Bd.
354	525	<i>Polites sabuleti</i> Bd.
	600	<i>Thorybes mexicana</i> Her. Schaf.
334	621	<i>Thanaos persius</i> Scud.
	629	propertius Lint.
	635	tristis Bd.
	642	<i>Hesperia tessellata</i> Scud. (sp. probably new)
328	646	cæspitalis Bd.

LIST OF TRUCKEE MOTHS.

Holland	Dyar	
73	659	<i>Lepisesia clarkiae</i> Bdv.
76	671	<i>Deilephila lineata</i> Fab.
51	702	<i>Sphinx perelegans</i> Hy. Edw.
54	730	<i>Smerinthus cerysii</i> Kirby. b. ophthalmicus Bdv.
93	764	<i>Pseudohazis eglanterina</i> Bdv.
108	817	<i>Clemensia albata</i> Pack.
128	863	<i>Diacrisia latipennis</i> Stretch.
128	865	vagans Bdv.
130	881	<i>Apantesis ornata</i> Pack.
135	911	<i>Euchætias oregonensis</i> Stretch.
145	947	<i>Alypia ridingsii</i> Grt.
153	976	<i>Apatela felina</i> Grt.
	1038	sp. near emaculata Sm.
157	1041	oblinita Sm. & Abb.
164	1101	<i>Caradrina meralis</i> Morr.
165	1105	extimia Wlk.
	1148	<i>Hadena evelina</i> French.
167	1151	violacea Grt.
	1154	paviæ Behr.
	1156	adnixa Grt.
	1157	indirecta Grt.
	1161	genetrix Grt.
	1164	unicincta Sm.
167	1166	mactata Guen.
	1168	divesta Grt.
	1177	sp. possibly antennata Sm.
168	1225	lateritia Hub.
	1226	cogitata Sm.
169	1232	devastatrix Brace.
169	1235	arctica Bdv.
	1237	pluviosa Wlk.
169	1238	occidens Grt.
	1248	centralis Sm.

Holland	Dyar	
	1258	<i>Polia ædon</i> Grt.
171	1259	<i>theodori</i> Grt.
		a. <i>epichysis</i> Grt.
171	1278	<i>Hyppa</i> sp. related to <i>xylinoides</i> Guen.
174	1300	<i>Prodenia ornithogalli</i> Guen.
		b. <i>præfica</i> Grt.
178	1390	<i>Rhynchagrotis rufispectus</i> Morr.
178	1395	<i>placida</i> Grt.
	1396	<i>variata</i> Grt.
	1398	<i>trigona</i> Sm.
	1404	<i>exsertistigma</i> Morr.
	1413	<i>Adelphagrotis indeterminata</i> Walk.
180	1425	<i>Abagrotis erratica</i> Sm.
182	1454	<i>Agrotis ypsilon</i> Rott.
	1467	<i>Peridroma margaritosa</i> Haw.
	1495	<i>Noctua sierræ</i> Harv.
	1498	<i>pyrophiloides</i> Harv.
	1501	<i>piscipellis</i> Grt.
	1546	<i>Feltia gravis</i> Grt.
		<i>Porosagrotis catenuloides</i> Sm.
	1555	<i>satiens</i> Sm.
		<i>Paragrotis flutea</i> Sm.
188	1577	<i>brevipennis</i> Sm.
	1588	<i>brocha</i> Morr.
	1590	<i>cogitans</i> Sm.
	1608	<i>gagates</i> Grt.
189	1661	<i>lutulenta</i> Sm.
	1679	<i>murdockii</i> Sm.
	1691	<i>cariosus</i> Sm.
	1704	<i>alticola</i> Sm.
	1706	<i>rena</i> Sm.
189	1707	<i>insulsa</i> Walk.
189	1708	<i>albipennis</i> Grt.
189	1711	<i>tessellata</i> Harris.
	1718	<i>nostra</i> Sm.
190	1719	<i>ochrogaster</i> Guen.
	1726	<i>perexcellens</i> Grt.
	1736	<i>divergens</i> Walk.
191	1759	<i>Ufeus plicatus</i> Grt.
193	1793	<i>Mamestra radix</i> Walk.
	1802	<i>u-scripta</i> Sm.
195	1832	<i>olivacea</i> Morr.
		b. <i>comis</i> Grt.
		c. <i>rectilinea</i> Sm.
	1851	<i>pensilis</i> Grt. (near)
196	1879	<i>Admetovis oxymorus</i> Grt.
196	1884	<i>Dargida procinctus</i> Grt.
	1895	<i>Xylomiges rubrica</i> Harv.
201	1958	<i>Heliophila minorata</i> Sm.
	1960	<i>rubripallens</i> Sm.
	1972	<i>dia</i> Grt.

Holland	Dyar	
	2000	<i>Orthodes irrorata</i> Sm.
	2017	<i>Graphiphora curtica</i> Sm.
	2048	<i>Stretchia plusiiformis</i> Hy. Edw.
	2051	addenda Sm.
	2069	<i>Cleoceris elda</i> Frch.
	2070	rectifascia Sm.
	2071	curvifascia Sm.
207	2115	<i>Litholomia napæa</i> Morr.
208	2118	<i>Calocampa nupera</i> Lint.
208	2121	curvimacula Morr.
	2168	<i>Gortyna medialis</i> Sm.
215	2207	<i>Scoliopteryx libatrix</i> Linn.
216	2209	<i>Pseudorthosia variabilis</i> Grt.
216	2210	<i>Pseudoglæa blanda</i> Grt.
	2223	<i>Orthosia euroa</i> Grt. & Rob.
		verberata Sm.
218	2245	<i>Orrhodia californica</i> Sm.
219	2260	<i>Zotheca tranquila</i> Grt.
		a. viridula Grt.
		<i>Ipimorpha nanaimo</i> Barnes.
220	2267	<i>Atethmia rectifascia</i> Grt.
227	2341	<i>Schinia acutilinea</i> Grt.
229	2397	<i>Melanoporphyrina oregona</i> Hy. Edw.
229	2399	<i>Pseudotamila vanella</i> Grt.
	2492	<i>Autographa gamma</i> Linn.
		b. californica Speyer.
238	2496	brassicæ Riley.
251	2663	<i>Tarache flavipennis</i> Grt.
	2772	<i>Meliopotes versabilis</i> Harv.
259	2784	<i>Syneda alleni</i> Grt.
263	2831	<i>Catocala californica</i> Edw.
		californica var. Edw.
		nevadensis Beut.
		nevadensis var. montana Beut.
263	2843	stretchii Behr.
		stretchii var. sierræ Beut.
264	2855	faustina Stretch.
		b. verecunda Hulst.
		near carlota Beut.
	2856	irene Behr.
265	2860	aholibah Streck.
	2993	<i>Homoptera salicis</i> Behr.
287	3080	<i>Hypena humuli</i> Harris.
		b. albopunctata Tepper.
293	3092	<i>Melalopha apicalis</i> Walk.
304	3184	<i>Bombycia improvisa</i> Hy. Edw.
313	3218	<i>Malacosoma californica</i> Pack.
	3353	<i>Eustroma nubilata</i> Pack.
	3357	<i>Neolexia xyliana</i> Hulst.
	3379	<i>Mesoleuca truncata</i> Hufnagel.
	3384	ethela Hulst.

Holland	Dyar	
331	3387	<i>Hydriomena sordidata</i> Fab.
	3394	sp. close to <i>similaris</i> Hulst.
	3407	<i>excurvata</i> Grt.
331	3416	<i>Triphosa dubitata</i> Linn.
331	3417	<i>progressata</i> Walk.
	3419	<i>Cœnocalpe magnoliata</i> Guen.
332	3436	<i>Marmopteryx marmorata</i> Pack.
	3460	<i>Petrophora convallaria</i> Guen.
333	3512	<i>Leptomeris magnetaria</i> Guen.
336	3550	<i>Eois sideraria</i> Guen.
	3569	<i>Eucrostis viridipennata</i> Hulst.
	3586	<i>Chlorosea nevadaria</i> Pack.
338	3610	<i>Dasyfidonia avuncularia</i> Guen.
339	3638	<i>Deileina behrensaria</i> Hulst.
	3639	<i>fumosa</i> Hulst.
	3656	<i>Sciagraphia neptaria</i> Guen.
339	3664	<i>mellistrigata</i> Grt.
	3706	<i>Cymatophora bitactata</i> Walk.
	3715	<i>decorata</i> Hulst.
	3721	<i>guenearia</i> Pack.
342	3747	<i>Sympherta tripunctaria</i> Pack.
342	3760	<i>Enemera juturnaria</i> Guen.
343	3784	<i>Alcis sulphuraria</i> Pack.
343	3803	<i>Paraphia subatomaria</i> Wood.
343		a. <i>unipuncta</i> Haw.
347	3902	<i>Sicya macularia</i> Harris.
		a. <i>truncataria</i> Guen.
	3936	<i>Hyperitis trianguliferata</i> Pack.
		<i>Azelina giganteus</i> Brossbk.
	4144	<i>Cossus populi</i> Walk. or
		a. <i>orc</i> Streck.
397	4443	<i>Pyrausta unifascialis</i> Pack.
	4446	<i>semirubralis</i> Pack.
	4447	<i>perrubralis</i> Pack.
422	5360	<i>Archips cerasivorana</i> Fitch.
444	6608	<i>Hepialus mcglashani</i> Hy. Edw.

PRICES OF TRUCKEE LEPIDOPTERA.

First. I will offer my entire output of Truckee specimens at 5 cents each. This includes all rare species which I now have or which may be captured or bred during 1914, together with all new and undetermined species. Specimens of a given species will be limited to 100; moths will be pinned, butterflies in papers; dates of capture or hatching given; names given when known; all specimens guaranteed absolutely perfect on arrival at destination; no microlepidoptera included; will furnish pins and boxes but boxes must be returned; purchaser will pay all express charges; annual output (estimated) 10,000 to 15,000 specimens; payments to be made upon receipt of each shipment.

Second. Limiting number of specimens of each species to fifty price will be $7\frac{1}{2}$ cents each.

Third. Limiting number of specimens of each species to ten price will be 10 cents each.

Fourth. Limiting number of specimens of each species to two price will be $12\frac{1}{2}$ cents each.

Under the above offers no order will be accepted for a less sum than \$25.00 and a cash deposit of this amount must accompany all orders as a pledge of good faith. Purchasers are requested to send no money until details of contract are thoroughly understood and arranged.

Parties desiring all species of this region may receive the majority at once, and the missing species as soon as they come into my possession, preference being given to priority of order.

PRICES OF EGGS AND COCOONS.

I will supply eggs and pupæ of the above named moths and butterflies (excluding the more common varieties), at one cent each for eggs and five cents each for pupæ, during 1914. Those of each species will be limited to 100; postage prepaid to all points in the United States; if eggs or pupæ hatch en route it will be my loss. Last year's material has been disposed of, and orders will be given preference according to the dates when received. During the present year I shall breed only desirable varieties. Of course, I cannot agree to supply some of the rarer varieties during any given year, or at all, but will agree to supply each patron with his pro rata of the rarest varieties when I secure them. To save misunderstanding let it be clearly understood that this offer does not mean that purchasers may name the rarest varieties and receive them at these prices without including in the order the less valuable species. Contracts will be made to furnish the best my farm produces to those who take all the kinds that it produces. Correspondence solicited.

EGGS OF THE LARGER MOTHS.

If orders are given in advance I can furnish during the summer months eggs of *Cecropia*, *Polyphemus*, *Luna*, *Cynthia*, *Egланterina*, *Promethea*, and many other large moths at \$1 per hundred eggs of each species, postage prepaid and safe transportation guaranteed. Many correspondents purchased eggs last year in order to rear these magnificent moths. They can be easily bred in almost any locality. All orders must be accompanied by cash, and will be filled in the order in which they are received. Whenever shipments cannot be made money will be returned.

ANNOUNCEMENT OF AN INVENTION.

From the large number of letters received concerning the prices of bright colored butterflies for art work I feel warranted in predicting that in the near future by far the largest market for lepidoptera will be for display purposes. Many inventors are trying to devise methods of producing butterfly jewelry, butterflies are mounted in a number of fascinating styles, and ingenious and beautiful plaques, trays and artistic frames are being offered for sale and find a ready market. There is such a demand for this kind of work that some one will succeed in producing a device that will bring the beautiful moths and butterflies into almost every home. The Riker mount and the Denton Brothers' mount have undoubtedly done much to popularize entomology and each year they will create a greater and greater demand for beautiful lepidoptera. With the assistance of my parents I have invented what may be termed a card-method of mounting entomological specimens which I trust will meet with popular favor. I am quite sure that the time is ripe for a safe, inexpensive and artistic method of mounting butterflies, and I believe that I can offer something which will enable each one of my pupils to sell the greater part of the output of his butterfly farm. In the next issue of *The Butterfly Farmer* I hope to be able to give further details of the invention, and to be in a position to request an inspection of its merits at the hands of my friends.

N. B.—TO ENABLE ME TO GIVE MY PERSONAL INSTRUCTION BY LETTER TO EACH PUPIL THE CORRESPONDENCE COURSE WILL BE LIMITED. ONLY A SMALL EDITION OF "THE BUTTERFLY FARMER" IS PUBLISHED, AND, ALL SUBSCRIPTIONS DURING THE YEAR WILL BEGIN WITH VOL. 1, NO. 1.

Address all letters: (MISS) XIMENA McGLASHAN,
Truckee, California.

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MAY, 1914

No. 9

THE BUTTERFLY FARMER

A MONTHLY MAGAZINE FOR
AMATEUR ENTOMOLOGISTS



XIMENA McGLASHAN
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C. F. McGLASHAN { *Associate Editor*
 Business Manager

*A Comprehensive Correspondence Course in Entomology,
Conducted Under the Auspices of The Agassiz Association,
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A CALIFORNIA COLEOPTERIST.

Among the many zealous entomologists of California I know of no one who takes a warmer interest in assisting beginners than Rensselaer J. Smith, M. D., of Milpitas, Santa Clara County, California. He has helped me in my work so bountifully, by loaning me books and records and in a thousand other ways, that no words can express my gratitude. Many of my correspondents have been the recipients of his generous kindness.

Dr. Smith was born near Albany, New York, March 15, 1858, and is descended from the early German and English settlers of York State, including the Van Rensselaers. Reared as a farmer boy, he attended grammar school and boy's academy, took a three years' course at the State Normal College at Chicago, and graduated with honor from the medical department of the University of New York City, receiving his degree in March, 1884. He practiced medicine and surgery for nearly twenty years in Albany and during the last ten years in California. He is recognized as one of the leading men in his profession, has a large and lucrative practice, has a wife and 15-year-old son, a beautiful home and is a genial, lovable gentleman. He is a prominent member of both County and State Medical Societies, a distinguished member of the leading fraternal organizations, and is withal a botanist, lepidopterist and coleopterist of national and international fame. For many years botany was his favorite study and he exchanged with many of the leading universities of Europe and America. He collected with Professor Heller in the Yosemite, Rev. Dr. Robertson on the desert and in Southern California, and was a friend and co-worker with Professors Jepson and Hall. He finally donated his entire herbarium of

mounted flowering plants, numbering over two thousand specimens, to the University of California. During the last few years he has devoted all his spare time to coleoptera and lepidoptera, especially the former. He is an indefatigable collector, a close observer, a true scientist and numbers among his correspondents some of the foremost coleopterists of the world.

WANTED: FOODPLANTS OF THESE BUTTERFLIES.

The foodplants charts which were published last year will be sent postage prepaid to any address upon request. Before revising these charts I want, if possible, the foodplants of any of the following list of butterflies (Dyar's nomenclature has been used):

Parnassius nomion, *eversmanni*; *Iphidicles sinon*; *Papilio americanus*; *Ithobalus acauda*; *Archonias lyceas*; *Leptalis melite*; *Neophasia terlooii*; *Tachyris margarita*, *amaryllis*; *Pontia nelsoni*; *Synchlœe olympia*, *lotta*, *cethura*, *pima*; *Aphrissa statira*; *Phœbis argante*; *Gonepteryx clorinde*; *Kricogonia lyside*, *fantasia*, *unicolor*; *Eurymus hecla*, *boothii*, *hartfordii*, *occidentalis*, *christina*, *interior*, *pelidne*, *palæno*, *nastes*, *moina*; *Pyrisita gundlachia*, *proterpia*, *mexicana*, *boisduvaliana*; *Eurema westwoodi*, *euterpe*, *linda*, *jucunda*, *gnatheme*; *Colænis julia*.

Argynnis nokomis, *nitocris*, *leto*, *lais*, *hippolyta*, *cornelia*, *electa*, *columbia*, *bremnerii*, *zerene*, *monticola*, *rhodope*, *behrensii*, *halcyone*, *platina*, *coronis*, *calippe*, *snyderi*, *nevadensis*, *chitone*, *rupestris*, *laura*, *semiramis*, *inornata*, *atossa*, *adiaste*, *eurynome*, *montivaga*; *Brenthis pales*, *youngi*, *triclans*, *chariclea*, *freija*, *polaris*, *frigga*, *astarte*.

Lemonias cooperi, *colon*, *ancia*, *maria*, *nubigena*, *gillettei*, *quino*, *helvia*, *sterope*, *acastus*, *neumœzeni*, *whitneyi*, *hoffmanni*, *gabbii*, *approximata*; *Cinclidia ulrica*, *dymas*, *perse*, *albiplaga*; *Thessalia wrightii*, *alma*, *theona*, *cyneas*, *thekla*, *bollii*, *definita*; *Schœnis minuta*, *arachne*, *nympha*; *Charidryas ismeria*.

Phyciodes vesta, *phaon*, *batesii*, *pratensis*, *barnesi*, *montana*; *Microtia elva*; *Anthanassa frisia*, *tulcis*; *Chlosyne janais*, *erodyle*; *Mestra amymone*, *floridana*; *Polygonia hylas*, *oreas*, *silvius*; *Anartia jatropha*; *Victorina steneles*; *Hypanartia lethe*; *Eunica monima*, *tatila*; *Diæthria clymena*; *Amphichlora fornax*, *feronia*; *Timetes coresia*, *chiron*; *Athena peleus*, *eleucha*.

Basilarchia floridensis, *obsoleta*; *Limenitis bredowii*; *Chlorippe antonia*, *leilia*, *alicia*, *cocles*; *Smyrna karwinskii*; *Cœa acheronta*; *Historis odius*; *Anæa portia*, *morrisonii*; *Cercyonis wheeleri*, *gabbii*, *paulus*, *sylvestris*, *cetus*, *sthenele*; *Gyrocheilus tritonia*; *Erebia fasciata*, *discoidalis*, *rossii*, *disa*, *vidleri*, *youngi*, *tyndarus*, *sofia*; *Neominois dionysius*.

Coenonympha elko, *ochracea*, *kodiak*, *pamphilus*, *typhon*, *haydenii*; *Enodia creola*; *Æneis nevadensis*, *tarpeia*, *norna*; *Neonympha henshawii*; *Cissia mitchelli*, *rubricata*; *Epinephele xicaque*; *Dircenna klugii*; *Mechanitis californica*; *Dynothea lycaste*; *Lycorea cleobæa*; *Hypatus carinenta*; *Chrysobia mormo*, *duryi*, *cythera*; *Emesis zela*; *Calephelis cænius*, *borealis*, *australis*, *nemesis*; *Caria melicerta*; *Eumæus minyas*; *Hypaurotis crysalus*; *Eupsyche telea*, *hugon*, *jada*.

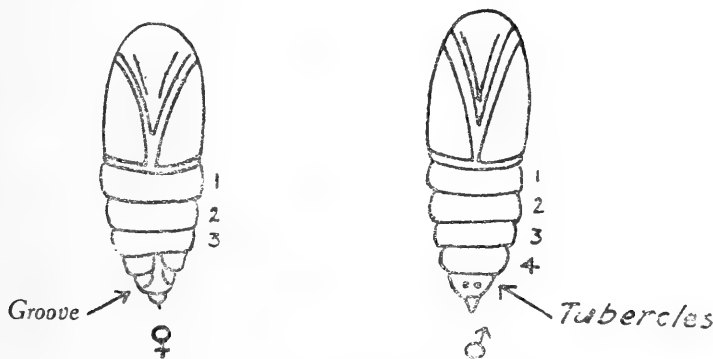
Thecla alcestis, *californica*, *itys*, *auretorum*, *dyope*, *sylvinus*, *wittfeldii*, *ontario*, *putnami*, *spadix*, *tetra*, *chalcis*, *sæpium*, *adenostomatis*, *tacita*, *spinetorum*, *blenina*, *castalis*, *ilavia*; *Mitoura simæthis*, *acis*; *Calycopis cecrops*; *Callicista columella*, *clytie*, *leda*, *ines*; *Incalisia iroides*, *fortis*, *mossi*; *Callophrys affinis*, *apama*, *sherdanii*; *Erora læta*; *Tharsalea virginicensis*, *hermes*; *Gæides dione*; *Epidemia dorcas*; *Chalceria rubidus*.

Satyrium fuliginosa; *Cupido heteronea*, *clara*, *sæpiolus*, *amica*, *pembina*, *phileros*, *ardea*, *kodiak*, *mela*; *Nomiades xerces*, *couperii*, *lygdamas*; *Phædrotes*

speciosa; *Agriades podarce*, *aquilo*; *Rusticus enoptes*, *glaucon*, *battoides*, *lotis*, *aster*, *annetta*, *anna*, *neurona*, *chlorina*; *Everes monica*; *Hemiargus isola*, *gyas*, *cyna*; *Brephidium isophthalma*; *Leptotes theonus*, *striata*; *Pyrrhopyga araxes*.

Amblyscirtes nysa, *eos*, *celia*, *ænus*, *simius*, *cassus*, *nanno*, *textor*; *Pamphila floridæ*; *Potanthus dara*; *Ancyloxypha longleyi*, *arene*; *Copæodes procris*, *wrightii*, *myrtis*, *eunus*; *Oarisma garita*, *powescheik*, *edwardsii*; *Poanes massa-soit*; *Atrytone hobomok*, *taxiles*, *uricola*; *Erynnis comma*, *harpalus*, *pawnee*, *ottoe*, *lasus*, *cabelus*, *napa*, *scudderi*, *rhesus*, *carus*, *uncas*, *licinus*, *attalus*, *yuma*; *Anthomaster snowi*, *meskei*, *nemorum*, *sylvanoides*, *agricola*, *milo*, *pratincta*, *verus*; *Hylephila stigma*, *morrisonii*; *Thymelicus chusca*, *draco*, *siris*, *mardon*, *cernes*, *alcina*; *Polites baracoa*; *Euphyes vestris*, *bellus*, *osyka*, *comus*, *eufala*, *arabus*, *fusca*, *oslari*, *nereus*; *Lerema loammi*, *horus*, *deva*, *lunus*, *hianna*; *Oligoria maculata*, *drurii*; *Prenes panoquin*, *panoquinoides*, *ocola*, *errans*; *Calpodes cossinia*, *pittacus*, *python*, *cestus*, *rhenia*; *Limochroes bimacula*, *pontiac*, *yehl*, *dion*, *arpa*, *byssus*, *phylace*; *Phycanassa viator*, *carolina*, *streckeri*, *howardi*, *aaroni*, *melane*, *lagus*, *aragos*; *Erycides urania*, *lilea*, *batabano*, *amintas*.

Eudamus simplicius, *dorantes*, *albofasciatus*, *drous*, *zilpa*, *alcæus*; *Heteropia melon*; *Rhabdoides hesus*, *zestos*; *Proteides idas*; *Telegonus hahneli*; *Thorybes epigona*, *coyote*, *drusus*, *outis*, *hippalus*, *caicus*, *æmilia*, *mexicana*, *electra*; *Achylodes thraso*, *asychis*; *Pholisora mexicana*, *pirus*, *ceos*, *libya*, *alpheus*, *lena*; *Systasea pulverulenta*; *Grais stigmaticus*; *Timochares ruptifasciatus*; *Staphylus brennus*; *Thanaos somnus*, *ausonius*, *afranius*, *petronius*, *terentius*, *propertius*, *pacuvius*, *tatius*, *clitus*, *funeralis*, *tristis*, *tibullus*, *plautus*; *Helioptes laviana*; *Hesperia ericetorum*, *macaria*, *domicella*, *centaureæ*, *philetas*, *xanthus*, *scriptura*, *nesus*, *unna*, *polingii*, *syrichtus*.



HOW TO TELL SEX OF PUPÆ.

Prof. William Reiff, Managing Director of the New England Entomological Company, 366 Arborway, Forest Hills, Boston, Mass., writes:

"By the sketch I am giving you above you will see best the difference in male and female pupæ. It is not a sketch of a particular species, but one which holds through in all the pupæ of moths, naked or in cocoons, of course with slight difference in the various families. The difference in sex probably is most striking among the *Sphingidæ*, and every amateur should be able to remember that in this group the male pupa has four segments without any marks, while the female pupa has but three segments without any marks (on the ventral side). The sketch shows that male pupæ have two tubercles where the genitalia are placed, while the female pupæ have there a kind of slight depression."

NOTES ON THE ORTHOPTERA.

By M. P. Somes, Missouri State Fruit Experiment Station, Mountain Grove, Missouri.

The Orthoptera comprises a group including types of so widely varying forms as to be quite confusing to the beginner. Of course, every one prides himself that he knows a "grasshopper" or a "cricket" when he sees one, but even here there is good chance for error. Aside from these common forms there are also such groups as the Roaches, the Walking Sticks, the Walking Leaf Insects and the Mantids, to say nothing of some of the more rare exotic forms which at casual examination would appear to have no connection with the forms we know as the Orthoptera. For a general definition of this rather heterogenous order we may say that it includes all those insects which have true mandibulate or chewing type of mouth and have an incomplete metamorphosis. Thus there is never a pupa stage and the young have from the first the same general form as the adults, save that in those forms with winged adults the young are at first wingless and gradually develop the wings with successive moultings until maturity is reached.

The name Orthoptera signifies "straight winged" and is thus hardly fitting as there are in this order forms with four wings, two wings, or with no wings. There are also forms with long wings and with short wings, with "straight" wings and with curved or arcuate wings. In point of habitat the order is represented in every zone save the Frigid by a goodly number of types, varying from semi-aquatic to terrestrial and arboreal, and having feeding habits varying from vegetarian, the ruling type of the order, to predaceous, carnivorous, or even parasitic.

Thus those of us who are familiar with the Lepidoptera, for instance, may see that here we have a much more erratic and varying group and one in which the subgroups run into some of the most interesting types of the whole insect world.

The order may be divided primarily into two great groups—the Non-Saltatoria, or Non-Leaping Orthoptera, in which the hind legs are not especially stouter or longer than the others, and the Saltatoria, or Leaping Orthoptera, in which the hind legs are especially fitted for leaping, having the basal joint stouter and being usually longer than the other pairs of legs. An examination of any common grasshopper as a type of the Leapers and of a roach as a type of the Non-Leapers will make this distinction clear. The first group—the Non-Leaping Orthoptera—may be again subdivided into three families, as follows:

The body broad, flattened, ovate, the head recurved under the thorax; legs fitted for running . . . The Roaches (*Blattidæ*).

The body elongate, not distinctly flattened, head not recurved under thorax; legs long and slender, not fitted for rapid movement.

Front legs eminently fitted for grasping prey; antennæ short and slender . . . The Mantids (*Mantidæ*).

Front legs slender, not fitted for grasping prey; antennæ long and rather stout . . . Walking Sticks (*Phasmidæ*).

Of the above the Roaches are best known by the few species which have become cosmopolitan pests, such as the Croton Bug or German Roach (*Blattella germanica*), or the Oriental Roach (*Blatta orientalis*), sometimes called the "Black Beetle"; but there are in almost every locality a number of native species, harmless, unobtrusive little insects living under the bark of trees, rocks and fallen cacti or other places of concealment. Most of these species native to America

are of moderate size and of varying shades of brown, sometimes marked with black. All are shy and active and not easy to capture, as their flattened form permits them ready escape in crevices and crannies. The eggs are deposited in pouches known as ootheca. The young resemble the adults in general form, but are wingless, while some species of the adults are provided with wings, the length varying in different species.

The Mantids are the one family of truly carnivorous Orthoptera. They are rather stout though elongate, short-winged, clumsy insects, having the middle and hind pair of legs rather weak, while the front pair, strong and heavily spined, are developed into formidable organs for grasping their prey. When at rest the prothorax is somewhat elevated and these grasping legs are held folded against the thorax in what appears an attitude of devout meditation, from which they have been called in some cases "Praying Mantis." Far from religious is their real purpose, however, as the near approach of a small insect will result in a swift grasping of the incautious insect, which is then borne to the cruel, powerful mandibles and calmly devoured in spite of its struggles. After the repast is completed the prayerful attitude is again resumed. The Mantids are commonly found perched amid the branches of trees and shrubs and from their sluggish movements and dull usually protective coloration, are not commonly noticed. They are in general southern in range, and there are but about twenty species known in the United States. Common rumor has it that they are poisonous and they have been called by such names as "Mule Killers" and "Devil Horses." It need hardly be said that they are as much misjudged in this regard as in regard to their supposed religious propensities, and none are at all harmful, indeed, they are to be considered as among our most beneficial insects, from the vast numbers of other insects harmful to vegetation which they destroy.

The Phasmidæ includes in America a number of attenuate insects commonly known as the Walking Sticks, but in the tropics, where it is more varied, it includes also such forms as the Leaf Insects, in which the body and the segments of the legs are broadly flattened, the colors usually green and the wings heavily veined, giving a resemblance to the leaves of plants which must be highly protective. In the tropics also the Walking Stick types are abundant and some reach great size, some attaining a length of nearly fifteen inches. In America, where the group is poorly developed, the largest species is *Megaphasma denticrus*, which is found from the Gulf of Mexico north to Missouri, while the most common of these insects belong to the genus *Diapheromera*. Like the Mantids, these insects are commonly found on the branches of trees and shrubs, where they feed upon the leaves. The eggs are dropped singly to the ground beneath. In all of the Phasmids the males are smaller and more brightly colored than the female.

(To be continued).

THE CANADIAN ENTOMOLOGIST.

A monthly Magazine Devoted to the Study of Scientific Entomology, Volume 46, begins in January, 1914. It is the oldest established magazine of the kind in America and has a world-wide circulation. Subscription, \$2 (postage paid) per annum, which includes a copy of The Annual Report of the Entomological Society of Ontario to the Legislature. Editor, Dr. E. M. Walker, Biological Department, University of Toronto, Toronto, Canada.

Published by the Entomological Society of Ontario, Guelph, Canada.

FORCING EMERGENCE FROM COCOONS.

By Frank G. Wolfe, 840 Webster Ave., Scranton, Pa.

December 4th, 1913, I received from a dealer the following cocoons: Four *Hyperchiria* io, two *Luna* and one *Samia californica*. As I wanted these for my collection and feared that something might destroy them before Spring, I placed them on some moss in a starch box, one end open and the opening covered with a wire screen netting. This box I placed in my den and once in about ten days sprinkled with lukewarm water the moss and cocoons. Emergence took place as follows:

Jan. 23, 1914, 7:00 A. M., *Io* Female.

Jan. 28, 1914, 7:00 P. M., *Io* Female.

Jan. 29, 1914, 7:00 P. M., *Io* Male.

Feb. 9, 1914, 5:00 P. M., *Io* Male.

Feb. 11, 1914, 5:00 P. M., *Luna* Female.

Feb. 15, 1914, 5:00 P. M., *Samia cal.* Male.

Feb. 18, 1914, 4:45 P. M., *Luna* Male.

The only one of the above that was not seen and noted before the wings had expanded was the *Io* noted on January 23rd. I discovered this fully expanded and hanging to the top of the box at 7 a. m. after returning from a trip out of the city. This moth might have emerged the night before. Some of the others were heard moving in the cocoon and the emergence was noted with great interest. It is also interesting to note that from each cocoon I got a moth. However, I should not think of forcing the emergence of an insect at this time of the year unless I needed it for my collection, for the hardest thing for me to do is to place one in a cyanide bottle.

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Miss I. W. Blake, 355 Blake St., Westville Station, New Haven, Conn., writes:

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CORRESPONDENCE COURSE IN ENTOMOLOGY.

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Lesson IX: Spreading and Mounting Lepitoptera.

HOW TO PRESERVE A BUTTERFLY.

"How shall I preserve a butterfly?" is a frequent question. Do not preserve it at all. There is nothing to preserve. There are species which have no mouth organs and which, of course, cannot eat, and the kinds which do partake of food merely sip a little nectar from the flowers. There is absolutely nothing to decay about a butterfly, nothing which gives out the slightest offensive odor, nothing which requires a preservative. In the bodies of the larger moths are juices which will evaporate readily in an ordinarily dry atmosphere, but which may cause mold and spoil the specimen, if it is packed in a close receptacle, such as a tin box with a tight fitting cover, or if it is folded in a paper envelope which excludes the air. Scientists frequently make an incision in the under side of the large bodies of these moths, remove the contents and fill the cavity with cotton. If the edges of the incision are brought together and allowed to dry there will be no evidence of the operation unless one examines closely. If moths are spread promptly this is unnecessary, for their bodies will dry if exposed to the air. After being spread the bodies of some moths will "grease," as it is termed, but a bath of gasoline remedies this. There is a little blood in the bodies of moths and butterflies, or something which is termed blood. Last year I received \$5, with an urgent order for 50 drops of butterfly blood which a physician needed for some serum. I did not fill the order, nor do I believe that any one could have filled it, though it is said that physicians in China secure juices from the bodies of butterflies which are highly prized as cultures in laboratory work. In spite of all this, however, you do not have to worry about preserving your butterflies. They will keep for a thousand years and will retain their brilliant, exquisite colorings if they are properly shielded from light, dust and their other enemies.

YOU MUST SPREAD THE WINGS.

You should spread the wings of your butterflies and moths, but this is done not to preserve them, but to permit of a better examination of the wings, to insure symmetry and uniformity to the collection, and to properly display the markings, structure and colorings which the folded wings conceal. All beginners exaggerate the difficulties of spreading a butterfly. Collectors differ greatly in the details of spreading insects and no two follow exactly the same set of motions perhaps, yet all accomplish the purpose. It is worth five cents to spread a butterfly properly, though I understand that the general price paid is three and one-half cents. In my father's younger days Doll had a national reputation for spreading lepidoptera and received ten cents per specimen. He would mend a broken antenna or a torn wing whenever possible and was generally employed to spread exotics. Practice is the essential thing and almost any one, by almost any of the methods, can become quite expert if he is careful and painstaking.

THE SPREADING OUTFIT.

You should expand the wings of a butterfly until they are extended as when in flight, and should fasten them smoothly in a horizontal position until they dry. This requires a spreading board, a spreading needle, some narrow strips of paper and a supply of black mourning pins. To make an excellent spreading needle, take a tapering penholder and into the small end thrust the eye-end of a cambric needle, letting the point of the needle project half an inch. A small round stick the size of an ordinary slate pencil answers as well as a penholder. To thrust a needle into wood, heat the end where the eye is situated in the flame of an alcohol lamp and by means of a pair of forceps press the red hot end into the wood. Repeat the process until the hole is deep enough, and when the needle has cooled give it an extra pressure with the forceps. Strips of any tough, strong, smooth paper, such as druggist's wrapping paper, a good quality of writing paper or, best of all, the tracing-cloth used by surveyors, may be used to hold the wings in place while drying. They may be of any desired length, and from a sixteenth to say half an inch in width.

THE SPREADING BOARD.

If you have never seen a spreading board, send at once to the Entomological Supply Houses (see page 9) and purchase samples. You will make no mistake if you buy all your spreading boards instead of having them made at home. Any carpenter can make them after seeing a sample, but it is a luxury to have the best boards if you can afford them. They consist of two strips of soft wood, such as pine, redwood, linden or white-wood, fastened at the ends to cleats or braces. Between the two strips of board is a narrow groove in which the bodies of the insects may rest, and underneath this groove is a strip of cork or cork linoleum through which the pin passes. Sometimes a board on the bottom of the cleats contains the cork in which the pinpoints rest, and acts as an automatic height adjuster. As the wings on the two sides of the butterfly should be spread at equal heights and as uniformly as possible, the boards with guide lines are recommended for beginners. You should have an assortment of spreading boards having grooves and sides of different widths. The groove should be just a little wider than the body, and the sides of the board should be wide enough so that the ends of the wings do not project over the edge. The length of the board is immaterial. A board 12 inches long is very convenient.

AMERICAN AND ENGLISH METHODS.

The "American" or "Standard" method of spreading is to have the tips of the wings higher than the bases, and beveled boards are made higher at the sides than at the center. It is contended that in a damp atmosphere the wings are inclined to relax and droop and by having the tips of the wings elevated a collection presents a better appearance. The government at Washington has adopted the American plan and many scientists are among its enthusiastic advocates. On the other hand, the English method of spreading is to have the tips of the wings lower than the bases, the butterflies having a slight droop when removed from the boards. These different methods are mentioned not to confuse the beginner, but simply to inform him that entomologists do not agree on this subject. If you place your butterflies in Riker, Ximena McGlashan or Denton Brothers' mounts the wings should be level.

SETTING-BLOCKS INSTEAD OF BOARDS.

A method greatly in vogue among the earlier entomologists was to give each specimen an individual block containing a groove for the body, the wings being fastened to the surface of the block by winding thread around the wings and the block. In Holland's *Butterfly Book* these individual blocks are recommended, especially for the *Hesperidæ*. Many entomologists hold the wings in place while drying with pieces of glass, cardboard or thin sheets of mica. It can almost be said that each entomologist has a method of his own and when you become better acquainted with their views you will find, as a rule, that each one believes his particular method of spreading insects is the best. It is possible that scientists will sometime adopt a "best method," but until that time comes I advise each pupil to try all methods and employ the one he likes best. I do not employ the setting-needle, but I can recommend it as the easiest method of holding the wings in place.

THE SETTING-NEEDLE METHOD.

Holland's "*The Butterfly Book*" gives one method as follows: "When the insect has been pinned upon the setting-board or setting-block the next step is to set the wings in the position which they are to maintain when the specimen is thoroughly dry. This is accomplished by what is known as setting-needles. Setting-needles may be easily made by simply sticking ordinary needles into wooden matches from which the tips have been removed. In drawing the wings into position care should be taken to plant the setting-needle behind the strong nervure on the costal margin of the wing; otherwise the wings are liable to be torn and disfigured. When the wings have been adjusted into the position which they are to occupy, slips of tracing-muslin or of paper should be drawn down over them and securely pinned, the setting-needles being removed." French, Comstock and indeed almost all authorities approve of holding the wings in place with setting-needles. The only objection is that it leaves holes in the wings which, however small, disfigure the specimen, especially if it is mounted in such a manner that you can hold it up to the light and examine its wings closely.

HOW TO SPREAD A BUTTERFLY.

Do not try to spread insects which are not soft and pliable. The beginner should practice with large or medium size butterflies which are freshly caught. Place the spreading board on the table in front of you with its side toward you, not its end. As you will spread several insects upon the same board, the body of the first one should be placed in the end of the groove to the right, the ends of the antennæ being about an inch from the right end of the board, the right wings of the butterfly being nearest to you. Press the pin down in the cork until the wings are level with the upper surface of the board. With the spreading-needle touch the back of the large vein of the right fore wing, near its base, and gently move the wing forward a little way, taking care not to pierce the wing with the point of the needle. Fasten one end of a strip of paper in front of the butterfly, close to the end of the board and to the right side of the groove, by sticking a mourning pin through the end of the paper and firmly into the board. Taking hold of this strip of paper with your left hand, draw it above the right wings, close to the body and close to the upper surface of the wings, your thumb and finger being back of the butterfly and pulling the strip taut. By pulling the strip hard, holding the thumb and finger against the

board, it will press so firmly against the wing as to hold it in the position in which you have drawn it with the spreading-needle. When you draw the wings forward with the needle loosen the tension a little, and when the wing is where you want it, tighten the tension. Draw the front wing forward only a little way, hold it in place by drawing the strip taut, and with the spreading-needle draw the right hind wing forward the same distance; then draw the front wing a little forward and the hind one up to it again, repeating the process until the wings are expanded. Draw the slip very tight and fasten it with a mourning pin to the board just behind the wings and near the right side of the groove. Turn the board end for end, bringing the left wings nearer to you, and treat them in the same manner, fastening them when fully expanded with a strip of paper which is placed close to the body. When expanding and pinning down the wings on the left side it is likely that the right wings may slip back a little, but they can be very easily replaced. Then place one or more strips outside of and parallel with the first strips. Be sure and cover the tips and outer edges of the wings, else they will surely curl up during the process of drying.

DETAILS OF THE PROCESS.

If the wings are folded under the body, place the jaws of the forceps under the base of the wings and lift them upward and at the same time press the pinned butterfly downward into the groove of the spreading board. By lifting the wings on alternate sides they can be made to extend out horizontally at right angles to the body by the time the body has been pressed down into the groove. If the wings are folded over the back grasp the body underneath the wings with the jaws of your forceps and pinch hard. This will cause the wings to move downward until they are on a level with the body. "Breaking down" the wings with the forceps is the very first act unless the wings happen to be extended horizontally. It is the rule to bring the hind margins of the two front wings about in a line perpendicular to the body, so that the hind edges of the two wings form a straight line across the insect at right angles to the direction of the body. The hind wings are brought forward so that their front margins are nearly covered by the fore wings. This is the rule given by Comstock and all leading authorities. The antennæ should be extended at or near the front margin of the wing, and parallel with it. If they stand out in front they are very apt to be broken off. The abdomen should be raised or depressed, supported or pinned down, as occasion requires, by pins placed crosswise below or above the body. Two long strips of paper may extend from one end to the other of the spreading-board and may hold down the wings of a number of butterflies. This strip may be of tracing-cloth and for the sake of economy may be used over and over. I prefer, however, to cut off the strips of paper behind each butterfly before putting another on the board. In this way each butterfly is spread separately.

DRYING THE SPECIMENS.

The spreading-boards should be placed in a cupboard, box or case while the specimens are drying. Dust and dermestæ are always to be feared. A little naphthalene sprinkled in the drying case is a wise precaution. Mice, ants, spiders are only a few of the things that menace the insects while on the spreading-board. There are authors who advocate baking the specimens as soon as they have been arranged on the spreading-board in a slow oven for a couple of

hours to hasten the process of drying. This is of doubtful expediency unless one is compelled to turn out a large amount of material in a short space of time. The oven should never have a temperature exceeding 120 degrees Fahrenheit. Any great heat will surely ruin the specimens. If the boards are placed in a cool, dry place for two or three weeks the largest butterflies and moths will become thoroughly dry. The principal reason why wings relax and droop after being spread is that they were taken from the spreading-board too soon. If butterflies and moths are not fresh they must be relaxed before spreading and will dry on the boards much sooner than freshly caught specimens, say in two or three days, but freshly caught lepidoptera should never be taken from the boards in less than one week.

PATIENCE IS A FIRST REQUISITE.

If you relax specimens be sure they are quite soft and pliable before you attempt to spread them. Always relax them when they have dried so as to become the least bit hard or obdurate. The wings should yield at the slightest touch in order to give best results. Do not be in a hurry until you have had much practice at spreading. Begin by taking imperfect specimens. You will spoil many an insect before you have learned to do the work well. Moths are more troublesome to handle on the spreading-board than butterflies and small insects than larger. The white cabbage butterfly, *Pieris rapæ* Linn., is a type of those which are easiest to spread and which the beginner should try first. Be patient, keep trying. Hundreds of thousands of people have learned to spread butterflies, hence you surely can. Just keep trying. If you work every day for a week and spoil the wings of a hundred butterflies before you get one spread in a satisfactory manner, you will do as well as some beginners whom I have seen and who afterwards became expert.

MOUNTING LEPIDOPTERA.

Mounting an insect includes pinning, spreading, labeling and all other steps taken up to the time it is pinned in a box or cabinet, just as mounting a bird or animal in taxidermy means all processes from the removal of the skin to the finished exhibit. All the earlier works on entomology devoted pages to describing how to make cabinets. This custom has fallen into disuse because home-made cabinets cost about as much, if made properly, as Schmitt boxes and cabinets which are sold by the supply houses. If cabinets are not carefully and perfectly made, if the drawers do not work smoothly, or there are cracks or faulty joints which admit dust or insects, they cause endless annoyance and often the utter loss of the collection placed therein. Every collector should start a collection and should take the best possible care of his specimens, but I recommend plain, cork-lined cigar boxes until such time as you can afford the best boxes and cabinets. You will put your cigar boxes in a tight chest or box, with plenty of naphthalene or moth balls, while if you have an inferior cabinet or case of drawers you will trust it to protect your specimens, and ants or beetles will eat them up.

PRESENT METHODS UNSATISFACTORY.

The present system of mounting lepidoptera on pins and sticking them in cork-lined drawers is not altogether satisfactory. The cabinets are so expensive that people of moderate means can hardly afford a good collection. Specimens should be arranged in order, and when a drawer is full the introduction of a

new specimen frequently necessitates the rearrangement of the contents of the entire drawer. Only one side of an insect can be seen unless the pinned specimen is lifted out, and this is troublesome and endangers the delicate, fragile butterfly. If one can afford the expense, it is better to have a male and female of each species spread wrong side up, as well as a pair right side up, so that both sides may be examined in the drawer. It is so much trouble to pull out drawers and replace them, and the resultant jarring is so apt to injure the brittle specimens, that visitors are seldom shown more than a few drawers of the largest collections. Even the owner of a collection is apt to be ignorant of the beautiful colorings on the under side of many of his specimens, because it is not a light task nor a perfectly safe one to pin and unpin and handle and examine and study and replace each insect.

"THE XIMENA McGLASHAN CARD MOUNT."

During the last few years a number of improved methods of mounting lepidoptera have been placed upon the market and have been gladly welcomed by entomologists. There is a wide field for improvement and the person who finally discovers a perfect method will do much to popularize this science. With the assistance of my parents (and they have done the greater part of the work), I shall soon be able to furnish samples of my method of mounting lepidoptera. It is intended to be a card method and a collection can be safely kept in the same compact and convenient form as the usual card index filing systems in general use among business men. I claim greater safety for the insects, a minimum of expense in mounting and caring for the collection, a device which permits the free handling of the card and the examination of both sides of the butterfly without danger of breaking it, and the specimens are not glued in place or otherwise disfigured. The mount consists of two pieces of heavy cardboard having corresponding openings large enough to hold the insect. Across the inner surface of each of these cards is a network of threads of isinglass or silk, as nearly transparent and invisible as possible. When the cards are placed together the filaments on one card impinge upon those of the other card, and when a butterfly is laid between the two networks the pressure of the threads holds it firmly in place. The cards are thick enough to shield the body and appendages which project through the network. On the outside of each card is a sheet of isinglass, or of thin glass, which is held in place by facing paper, which may be embossed and appropriately embellished so as to present the general appearance of a postal card, an Easter card or ordinary photograph card. The two pieces of cardboard, the two sheets of transparent material and the facing card or board are glued together and the edges bound with passepartout or binding tape. The butterfly, suspended by the impact of the threads above and below its wings, appears in an opening in the center of a rather thick card, both sides being visible. The soft, yielding threads protect the insect from injury by accidental jarring and a card may even be dropped on the floor without damage.

N. B.—ALL SUBSCRIPTIONS DURING THE YEAR WILL
BEGIN WITH VOL. I, NO. 1.

Address all letters: (MISS) XIMENA McGLASHAN,

Truckee, California.

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VOL. I

JUNE, 1914

No. 10

THE BUTTERFLY FARMER

A MONTHLY MAGAZINE FOR
AMATEUR ENTOMOLOGISTS



XIMENA McGLASHAN
Publisher and Proprietor
TRUCKEE, CALIFORNIA

C. F. McGLASHAN { *Associate Editor*
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RICHARD E. KUNZE, M. D., PHAR. D., B. S.

The man who writes the history of the pioneer entomologists of the Pacific Coast has an enviable task. Without an exception they were brainy men, strong, original characters, honest, courageous, the highest type of manly men.

Well up near the head of the list will stand the name of Richard Ernest Kunze, Physician, Pharmacist, Entomologist, Botanist and all that the last sentence contains. Born in Altenburg, Germany, April 7, 1838, of an old Thuringian family, he was given a liberal education, including the classics, Latin, French, English and Greek. He was especially devoted to the Natural Sciences, and among some of his instructors were Schlenzig the Lepidopterist, Professor Apers the Entomologist, and young Karl Brehm, the future Ornithologist and African traveler.

Arriving in America in 1854, he graduated from the Metropolitan Medical College, and afterwards from the Electric College of New York. For twenty-seven years he successfully practiced medicine in New York City, and, because of failing health, in 1895 he came to Denver, and the next year to Arizona. Medical Botany and Entomology had always been his hobbies, and the medical and scientific journals of both continents have always been eager to publish his articles.

At Phoenix, Arizona, he has maintained for nearly twenty years a Cactus Farm, which has not only made him world-famous, but has given him a good

livelihood and afforded him ample opportunity for scientific research and correspondence. Few men have a wider circle of intimate friends among the distinguished men of science. Completely restored to health, he is a magnificent specimen of virile manhood. His desert home contains a fine library of Medical, Botanical and Entomological works.

He was married at nineteen years of age to Miss Ann McNamee, a native of Cardiff, Ireland. She was his helpmate and loving companion for thirty-one years. Her death occurred in May, 1888, and was one of the principal reasons for his failing health, his retirement from professional life and his going out into the desert to live among the butterflies, cacti and sunshine.

Our illustration shows Dr. Kunze and his "Hermitage," on his Cactus Farm at Phoenix, Arizona.

ANNOUNCEMENT: LAST QUARTER.

I have about decided that *The Butterfly Farmer* will not be published after the correspondence course is completed. The year will end with the August number. I am not at all ambitious to break into journalism, nor to keep before the public. My college studies, my butterfly farm and the instruction by letter of those who have subscribed for this course will be quite sufficient to keep me busy. At the very outset it was stated that the magazine form was adopted because it permitted greater elasticity in the presentation of the course. The contributions by scientists and other matters of interest form a valuable supplement to the course.

That a beginner should dare to publish an entomological journal with a subscription price of \$5 per annum must have terribly shocked some of the learned and scientific gentlemen of the entomological world. I presume it will quite astonish them to know that the task has been pleasant, that a large number of scientists have encouraged and assisted me and that the subscriptions will have been almost sufficient to defray all expenses of the venture. There will be a few copies of the complete course (twelve lessons) remaining unsold, and so long as they last I will offer them at five dollars. The money thus received will not only balance my expense account during the year, but will defray the expense of teaching the new pupils.

All who have subscribed or who may hereafter become subscribers are entitled to personal instruction by letter regarding their difficulties, and the opportunity is open to all. With some of the pupils this part of the course is by far the most important. Those who wish to learn may depend upon my help not only until August, but so long as I am engaged in the business, and I intend it shall be my life-work. My object in starting the course and in publishing *The Butterfly Farmer* was to give widest publicity to the fact that I am anxious to help all beginners who are eager to learn. The scientific world seems to recognize my sincerity, for its members frequently refer inquirers to me for information as to how to begin butterfly farming.

The entomological journals of America, with scarcely an exception, have placed me on their exchange lists, have published my advertisement gratis and have shown me every courtesy imaginable. Some of their editors have been among my best helpers. I feel quite sure that *The Butterfly Farmer* has accomplished all the good that I hoped for it in the beginning and more. I have had an enjoyable experience and am assured that in some instances my efforts have not been in vain.

NOTES ON THE ORTHOPTERA (continued).

By M. P. Somes, Missouri State Fruit Experiment Station, Mountain Grove, Missouri.

The second great group of the Orthoptera, the Leaping Orthoptera, may be divided into three families, as follows:

Antennæ much shorter than the body, relatively stout; tarsi or feet with three joints; ovipositor short and but slightly exerted The Locusts (Acridiidae).

Antennæ much longer than the body, slender, delicately tapering; feet with three or four joints; ovipositor commonly elongate, much exerted, either as a compressed blade or needle-like.

Tarsi or feet four jointed on all legs, or at least on the middle pair.

Tegmina or front wings, with the sides sloping; ovipositor usually in the form of a flattened blade, the tip not expanded. . . . The Green Grasshoppers (Locustidae).

Tarsi or feet three jointed, though not always alike in structure, on all the pairs of legs; tegmina or front wings flattened above and with the sides bent abruptly downward; ovipositor usually exerted, forming a cylindrical needle, with the tip more or less expanded. . . . The Crickets (Gryllidae).

These three families include by far the greater majority of our Orthoptera and are all more or less familiar to every one. They include about eight hundred species in the United States, of which number about sixty per cent belong to the first family, the Acridiidae, with the Locustidae next in point of numbers and the Gryllidae closing the list with relatively few species.

The Acridiidae, or "Short-Horn Grasshoppers," as they are sometimes called, are the true "Locusts," and at least in the United States include practically all of the seriously injurious forms of Orthoptera. Indeed, the ravages of one species, "The Rocky Mountain Locust," which belongs to this group, may be said to have made entomological history in this country some years ago, although at present this species is apparently extinct within our borders. The group is made up, so far as forms in the United States are concerned, of four subfamilies.

"The "Grouse Locusts" (Tettiginæ) are small insects, half an inch or less in length, with the upper portion or roof of the prothorax extended back, covering all or nearly all the abdomen. They are usually grayish or blackish in color and are usually found in moist, sandy places, many species being common along the margins of streams. In most species the hind femora are greatly swollen, giving a hint as to the truly surprising leaping powers possessed by these small locusts.

The second subfamily, the Tryxalinæ, has apparently no generally accepted common name, though they are frequently spoken of as the "Tryxalids." They commonly have an oblique head, slender form, with long slender legs, and the hind wings are commonly clear and transparent. They are insects of moderate to fairly large size, although some species are quite small. The dorsal portion of the prothorax projects but slightly, if at all, over the extreme basal segments of the abdomen. This subfamily is found most commonly in areas of rich, low vegetation, although some are to be found in fields and meadows, some in rocky places and a few even as rather serious pests in cultivated fields.

The third subfamily, the Oedipodinae, like the above, are not blessed with any common name. For the most part they may be distinguished by the fact that the hind wings are colored rather than transparent, the general field of the wing

being usually some shade of red, orange, yellow, or even blue, and frequently marked by a curved dark bar. The species are in general stouter than those of the preceding group, mostly possessed of strong powers of flight or of leaping. They are in large part lovers of dry, open places, such as rocks, sandy fields and the like. This is the largest subfamily as represented in the United States and its members may be found at almost any point. Relatively few species are to be considered as serious pests, since most are found among "weeds," although some, as the Clear Winged Locust, *Camnula pellucida*, are capable of doing considerable damage to crops.

The members of the fourth subfamily, the Acridiinae, are readily separated from those of the other groups by the presence of a distinct conical or cylindrical spine projecting from the front part of the sternum, usually from between the front legs. This is the largest subfamily in point of species and of individuals and is by far the most important when considered economically. To this subfamily belonged the "Rocky Mountain Locust," now apparently extinct, and its numerous relatives and the loss in the Agricultural returns due to these voracious pests even now amounts annually to a sum sufficient to establish, equip and endow numerous great universities. The largest single genus in the subfamily is *Melanoplus*, which, although found only in North America, includes about 150 species. The common "Red-Legged Garden Locust," *Melanoplus femur-rubrum*, is a very common and typical example of the group, and the species are so closely similar in many cases as to present one of the most puzzling series in the whole order. The subfamily is made up in large part of species fond of fields and open places covered with low vegetation, although a few are arboreal or semi-arboreal in habit. In none of our forms are the wings brightly colored or marked with contrasting color areas.

The Locustidae, or "Long-Horned Grasshoppers," are distinguished from the foregoing family by the characters given in the key above, and in most cases the long antennae, slender form and generally green coloration will enable any one to know them in the field. They are with few exceptions to be found either in moist places or amid the rank vegetation of marshy places. Some, however, are truly arboreal, some are to be found under rocks and like hiding places and some in caves. An interesting and aberrant subgroup is what have been termed the "Camel Crickets," brownish in color, wingless and having much more the general appearance of the crickets. These are found under rocks or frequently in excavations.

The Gryllidae, or Crickets, may be distinguished by the three jointed feet and the peculiarly folded wing covers, which are flattened dorsally and abruptly folded down at the sides. The common crickets are too well known to need description; the smaller "Day Crickets," so abundant amid the dry grass and vegetation during the bright days of summer, are also very familiar to those of us who frequent the open country, but some of the other groups are practically unknown, even to those who consider themselves "Nature Lovers." Among these more unnoticed groups are the "Mole Crickets," whose peculiar, scissor-like front legs are fit tools for this mole-like insect, burrowing underground to cut the roots that impede its progress. Next comes the Myrmecophilas, or "Ant-Loving Crickets," small fry of but the size of the ants among whom they dwell. These are the smallest of our Orthoptera and are seldom noticed save by the specialist or the professional collector. Another group of crickets of considerable economic importance is the "Tree Crickets," rather slender, white or greenish in color, and found on trees and shrubs. Certain

species, from their habit of puncturing the stems of raspberry to desposit the eggs, do considerable damage. The other groups are for the most part small, inconspicuous and relatively rare. There appears to exist a general idea that the common black, or "Field Cricket," is the famed "Cricket on the Hearth," which is, in fact, a very different insect, usually light brown in color and of more slender build. It is a common thing to see *Gryllus domesticus* included in popular lists of insects as "common" when, in fact, it is one of the black crickets, usually *Gryllus abbreviatus* or *G. pennsylvanicus*, which is really meant.

THE COST OF CONDUCTING NATURE STUDY WORK.

Editorial in *The Guide to Nature*, by Dr. Edward F. Bigelow.

Miss Ximena McGlashan, of Truckee, California, is conducting a correspondence course under the auspices of the Agassiz Association for the study of moths and butterflies. For amateur entomologists she issues a monthly magazine of sixteen pages and for this charges fifty cents a number, or five dollars a year in advance. The Agassiz Association is aiding her in every possible manner. Her advertisement is in this number of *The Guide to Nature*. The nature-loving public has been for so many years accustomed to the starting up of little magazines here and there at fifty cents a year that they are horrified at this young girl's audacity in daring to ask fifty cents for a copy of a sixteen-page pamphlet and five dollars a year for the yearly subscription. The consequence is that a number of letters have reached the Home Office protesting against such extraordinary and unseemly charges for so small a magazine. Some of our friends have told us that we should not permit such an extortionate business to be carried on under the name of The Agassiz Association. But we must confess that the more strenuous these appeals, the more have our sympathies gone out to this young girl, who is the first person of whom I have had any knowledge in twenty-four years of editing natural history magazines that has had the business sense to put the price at what the thing costs, and what, with liberal patronage, will insure its success and perpetuity.

Let us examine the matter as a correspondence course, and practically each of her subscribers is a member of a correspondence school, as is each subscriber to *The Guide to Nature*, whether a member of The Agassiz Association or not. It is a curious fact that correspondence schools have put their prices many times higher than five dollars and have built great edifices and prospered beyond description, but when any one puts the price for nature study work at five dollars there is at once an outcry and clamor of protest. Before me are the announcements of several correspondence schools in which the prices run from ten dollars upward. Not one is as low as five dollars. If there is any other correspondence school that conducts a course for five dollars I shall be pleased to hear from it. Miss McGlashan offers a magazine and personal instructions for one year for that sum. One would pay any good teacher of music a dollar or a dollar and a half for a half-hour's lesson. One lesson a month would cost \$18 a year. Miss McGlashan gives far more in her little magazine than any music pupil could possibly receive in a half hour of personal instruction. But we are told that in the last twenty-five years many little natural history magazines have been published at fifty cents a year. Yes, but where are they now? Fourteen years ago, while I was editor of "Popular Science News," that magazine incorporated in itself more than twenty magazines that had either been bought or had been discontinued because they could not succeed at fifty cents or a dollar or, in some cases, even one and one-half

dollars a year. Let us consider "The Butterfly Farmer" and do some figuring. With the utmost economy the editor has before her a serious financial hazard; so serious that every lover of nature should hasten to her aid. The salary of a stenographer, the printing of her stationery and the postage will cost not less than one hundred and fifty dollars a month, or one thousand eight hundred dollars a year. To meet that she must have three hundred and sixty subscriptions at five dollars each. I do not believe that she has yet found three hundred and sixty persons that so desire to study moths and butterflies that they are willing to pay five dollars to help in the study. That means the present subscribers must either pay more or must aid her in getting more subscribers. There can be no dodging of that logical conclusion. They must pay or that young girl must pay for them out of her own pocket. If she obtains four hundred subscribers at five dollars each she will have, after assuming all the risk and giving a year of her time and labor, the magnificent net profit of two hundred dollars.

But look for a moment from her magazine to *The Guide to Nature*, which could not be published on more economical basis. The net cost of the mechanical work for the year 1912 to 1913, as announced on page seventeen of the number for May, 1913, was, exclusive of the general expenses of the office, three thousand ninety-six dollars and seventy-five cents. This does not include a salary for the managing editor and for his secretary. They have none. Suppose we add twelve hundred dollars for salary for the editor and ten dollars a week for the secretary. That would make a total annual expense of four thousand eight hundred and sixteen dollars for issuing *The Guide to Nature*. We issued twenty-five hundred copies a month, making a net cost that would be a dollar and ninety-three cents for every subscription, provided there were no losses, no unremunerative extras, such as, for example, necessary exchanges with other magazines. The deficit between a dollar and a dollar and ninety-three cents a year must be made up by advertisements, membership fees and contributions. Every one that pays a dollar for this magazine is getting at least ninety-three cents as a present from some kind friend. This explains why magazine after magazine has gone down. The subscription price has been fifty cents or a dollar a year, the expenses two dollars. This magazine would have disappeared long ago if it had not been for the liberal advertising patronage and for contributions from friends. But Miss McGlashan is putting it exactly as it should be put. Each one that is benefited should pay the cost. Instead of fearing that she is charging too much, our only fear is that there may not be enough nature lovers willing to come to her assistance so not to leave a deficit for her to pay for their benefit.

Magazines and newspapers all over the country have sounded Miss McGlashan's praises. They have told us what a wonderful girl she is and what a great work she is conducting. Words of encouragement are pleasing and helpful, but actual cash to pay the printer is better. At present she needs commendation and free advertising of her work less than she needs good five dollar checks to help her in that work. The Agassiz Association is taking under its auspices this young girl and her great and commendable endeavor to conduct a correspondence school. We are carefully watching her work. Thus far it has met with our hearty approval and our earnest co-operation. That she has the courage and the honesty to charge five dollars a year for her magazine in no way lessens our respect for her nor our interest in her work. It costs that and more. It is worth that and more to those that want to know and to appreciate the Lepidoptera. We hope that she will continue and we hope that those hopes will be built on a cash basis. She deserves to have the expenses paid, and she deserves a fair remunera-

tion for her time and labor. In no other part of human endeavor has more been expended in efforts to give something for nothing or something for less than cost than in the zeal of nature lovers to aid, interest and instruct others in the investigation of nature. It is this generosity and lack of business acumen, perhaps, that accounts for so many disastrous failures.

WORMS THAT CARE.

By John F. Weigand, 1002 6th Ave. So., Wausau, Wis.

In regard to your article an "A Worm That Cares," what about *Samia cecropia* and *Callosamia promethea*, who make an ingenious trap-door at the top of their cocoon? If you have observed, it cannot be opened from the exterior, but can be easily done from the inside, and the size is small enough to give the moth a tight squeeze and thus remove the pupa case. The moth is not provided with the bombyc acid for cutting the threads of silk, as in the case of *Telea polyphemus*, and it is another case of a larva caring for its moth, the opening being of no use whatever to the caterpillar.

KIND WORDS.

F. H. Chapman, Franklin, Pa., writes: "I am in receipt of the sample copy of your magazine and monthly lessons on butterfly farming and cannot refrain from offering you my heartiest congratulations upon its general appearance and the simple way you have of treating every subject in detail. This is bound to be recognized by everyone as the only practical course on the subject of Lepidoptera, principally on account of all others leaving out the very things that I presume look to them insignificant, but which are to the amateur positively essential."

"UNDER HANDICAP."

If my opinion is of value on any subject it should be upon the merits of a good story, a real thrilling up-to-date story of the West. I am ready to stake my reputation as a judge of literature when I say Jackson Gregory's "Under Handicap," published by Harper Brothers last month, is the most readable, enjoyable, best-written story of the year. It can be obtained from any bookstore, or can be ordered through the news dealers. It holds your interest from start to finish. Test my ability as a critic by reading it and write me if I am not warranted in saying that it is something which every book-lover will prize. The fact that the book is dedicated to "Lotus McGlashan Gregory," my sister, and is from the pen of her husband, my brother-in-law, does not warp my judgment a particle.

MARKETING STIMULATES INTEREST.

Clara Alberts, 129 N. Galt Ave., Louisville, Ky., writes: "I want to mention that I am interested in this matter not for the financial returns only. The wonders of the insect world are in themselves ample reward, but learning that it is possible to market specimens unquestionably stimulates and adds interest to one who has a strong taste for studying nature. I enthusiastically agree with you that it is the most fascinating avocation ever discovered."

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Ward's Natural Science Establishment, 84-102 College Ave., Rochester, N. Y.

J. G. Duthie, editor "Canadian Thresherman and Farmer," Winnipeg, Canada.

Herman H. Brehme, 74 13th Ave., Newark, N. J.

M. Rothke, 1957 Myrtle St., Scranton, Pa.

Fred Breitenbecker, 427 East 144th St., New York, N. Y.

Geo. P. Engelhardt, Children's Museum, The Brooklyn Institute of Arts and Sciences, Bedford Park, Brooklyn, N. Y., wants clippings or sections of food plants containing living pupæ of the Sesiidæ.

The New England Entomological Co., Managing Director Prof. William Reiff, 366 Arborway, Forest Hills Station, Boston, Mass., buy and sell Lepidoptera and living material of insects that hibernate. Specialty: Catocala and pupæ.

M. P. Somes, Entomologist Missouri State Fruit Experiment Station, Mountain Grove, Mo.; Orthoptera and Coleoptera.

Dr. O. Staudinger and A. Bang-Haas, Residenzstrasse 34, Dresden-Blasewitz, Germany.

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A PUPIL'S LETTER.

Nell McMurray, 323 Locust St., Clearfield, Pa., writes:

I have just received my first butterfly money—\$9.08—from Prof. Reiff. Do not think it is paltry, for it is quite enough to pay me for my pins and cork. But the money is the least of the returns from my half-bushel chip basket full of material. The best part I want to share with you, and so quote from Prof. Reiff's letter: "I wish to congratulate you for your excellent care in packing, and as a result nothing became damaged during the transport. As a whole, I am delighted with your material, particularly with the specimens, which are, with a few exceptions, indeed very first quality. You have done very good in your first year and you certainly have the ability to do a good business in this line of work. I shall be very glad to deal with you in the future." You deserve part of this praise, so I repeat it. Prof. Reiff has sent me criticisms, advice and asked me to try to get certain material for him. I am beginning to realize the kindness of entomologists and am losing my fear of approaching them. I sent a box of moths to Dr. Barnes, and an order for eggs of two species and specimens of a third came back. Today most of my remaining little moths went to the Kny Scheerer Company to fill an order.

I have enjoyed studying your list in *The Butterfly Farmer*. How fine it is! My specimens thus far are common. Doubtless you have a richer field, but I have faith in our hills; surely I'll find a few flies that are worth while.

A great bundle of unprinted newspaper was bought for ten cents, and is mostly folded now; cigar boxes are being piled up; even my six calico frocks and two white sunbonnets are ready to go to work. I hope all your pupils are anticipating as happy a summer as I am. About the first of May I expect to go to New Washington—it's the cheapest place in the world to live if you are willing to dig in the garden and pick fruit. Making frocks for friends has brought me \$50, which will be ample to pay for my bread and butter. I'll eat and sleep in a little two-roomed house; my mother or one of my sisters will be with me most of the time. But most of the hours will be spent working with the flies. I'll have much more time to work than I had last year. Perhaps less time will be wasted, such as raising larvæ from the eggs when nearly full grown ones in colonies are common. I did that with *Hickory Halisidota*.

My brother is going to make me a light trap, and I have been planning to hang it near the blooming tame honeysuckle bush, about the middle of May; if a swarm of *Autographa basigera* comes, such as came last year for nectar, we'll capture some.

Some of Mr. Blackburn's locality pin labels have been ordered. They will surely make a box of moths look more attractive as well as save time. I am anxious to hear of your "card method of mounting." Once I thought I would be extravagant and buy a few of the Denton mounts for my own collection. I'd rather have a few flies well mounted than many poorly mounted.

ENTOMOLOGICAL NEWS.

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HUNTING CHRYSALIDS AND COCOONS.

(R. R. Rowley, Superintendent of Schools, Louisiana, Mo.)

In two previous articles published in the *Butterfly Farmer* the writer has given his readers his own collecting experiences in egg and larva hunting. This, the third installment of the series, will have to do with pupæ hunting.

Next to collecting imagoes, cocoon hunting is best understood by amateur entomologists, and it is doubtful whether the writer will add much to the knowledge even of the beginner. In the late Autumn and early Winter, after the leaves have fallen from the trees, cocoons may be sought. First a knowledge of the foodplants of the silk moths is necessary to avoid much loss of time in aimless search. It is true larvæ ready to pupate often fall from the food tree or crawl down in search of a suitable place in which to spin, and so are often found in unexpected places; still, barring a few species whose cocoons are not fastened to the twigs of the food tree and fall with the leaves in Autumn, a search for cocoons on the foodplants of their larvæ is always attended with much success. Four or five Winters ago the writer collected nearly two hundred cocoons of *Callosamia promethea* on sassafras and persimmon bushes in two days' time. In the Atlantic States cocoons of this same moth are abundant on wild cherry. Throughout the region east of the Great Plains to the Atlantic and Gulf the great brown-papery cocoons of *Platysamia cecropia* may be sought on apple, plum, wild cherry, crab, maple and, in fact, almost any young shrub. While many of these are found up on the branches, fastened lengthwise to the twigs, more may be secured at the base of the trees or the bottom of sprouts, often hidden by the high grass. On the twigs above, they suffer from the attacks of woodpeckers ("sap suckers") and, perhaps, jays. I have often found these cocoons with a neat hole bored in the side and the chrysalis sucked dry. The shrubbery of big cities is rich in cocoons. In the back yard of a residence in St. Louis, two years ago, I secured fourteen fine *Cecropia* cocoons on a little plum tree and the sprouts about it. Most of them were at the bottom of the sprouts, hidden in the grass.

In January, 1910, while strolling through the capitol grounds at Indianapolis, I noticed a great number of *Cecropia* and *Polyphemus* cocoons on the little trees of the park. Until this year I have always been able to gather up a great number of *Telea polyphemus* cocoons from the shade maples of Louisiana, Mo. For the first time in my recollection I have found none this winter. What per cent of the cocoons of *Polyphemus* fall with the leaves of Autumn is an unsettled question. In the case of *Luna*, all fall and are to be sought under the leaves on the ground. I want to confess frankly that I never found other than empty cocoons under walnut trees, though I once saw an imago of *Luna* just out of its cocoon near the base of a walnut tree and, by the way, it was one of those rare variations, a moth with the center of the hind wing black. Both *Luna* and *Polyphemus* are double brooded here and the moth mentioned above was an August "fly" and the cocoon was not new, but had the appearance of a hold-over from the Fall before. The most beautiful red-brown *Polyphemus* I ever saw was an August moth also. I once thought that the long fast of chrysalids might have something to do with the abnormal coloring of some butterflies and moths, but since then I have bred *Anthocharis genutia*, *Callosamia promethea*, *Hyperchiria io* and a few other species from two-year-old chrysalids and the imagoes were normal. In Eastern cities, especially New York, the cocoons of *Samia cynthia* fall along the sidewalks in great numbers. Neither *Cynthia* nor *Luna* larvæ could well do otherwise than fail to anchor their cocoons

in the trees, since the leaves of both walnut and ailanthus are compound and it would be impossible to encase the entire leaf stalk in silk. I have never been able to obtain the pupæ of *Hyperchiria* in the woods. The chrysalids of the great leopard moth *Ecpantheria scribonia* in its years of plenty may often be found in numbers under the bark of old dead stumps. The pupæ of hawk moths are usually found by accident. In gardens where tomatoes and potatoes have been cultivated and in tobacco patches, the jug-handled chrysalids of *Celeus* and *Carolina* are often spaded up in the Spring and quite plentifully in Southern sweet potato patches, *Macrosila cingulata*. By turning over logs in the forest and prying up flat rocks I have occasionally found chrysalids of *Dolba hylaeus*, *Eacles imperialis* and *Citheronia regalis*. The latter two the giants of all our Northern chrysalids. The hairy cocoons of the woolly bears are often to be found under boards and around sheds in our own back yards. I have found the chrysalids of the red admiral in cupped leaves of the big-leaved nettle, suspended from the silk lining of the leaf shelter, similarly in the narrow-leaved nettle and thistle in an intricacy of leaves and webs I have found pupæ of the painted lady. About hop vines and elm sprouts, chrysalids of *Interrogationis* and comma are often found. Under little shelters formed by drawing together and fastening with silk, the croton leaves, pupæ of *Anæa andria* are not rare in season. The pupæ of *Papilio* are occasionally found under shelter, as beneath a fence rail or a loose rock near the foodplants. I once obtained chrysalids of the eight-spotted-forester when feeding the larvæ on grape leaves, by cutting corn cobs in inch lengths and placing in the jars. The larvæ bored into the pith and pupated there.

The larvæ of *Catocala grynea* are also borers, though they will spin on a twig or stem by chewing the bark and spinning it into the cocoon. Ordinarily, when handy, they bore into rotten wood and pupate. Perhaps *polygama* and *ultronia* will do the same.

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Lesson X.—Relaxing; Nomenclature.

FRAGILE AS SPUN GLASS.

Dried butterflies are as fragile, as brittle as spun glass. Try to examine a specimen which has been sent you in a folded paper envelope and the chances are that you will break its legs, antennæ or even its head, wings and body. When insects are pinned or papered after being taken from the cyanide bottle, or when placed upon the spreading board, they must ever afterward be handled with extreme care, or they will snap and break at the least provocation. If you receive a shipment of Lepidoptera enclosed in papers, place it in the relaxing box without peeping into the papers. In a day or two the dried specimens will have absorbed sufficient moisture to enable you to handle them safely. If you wish to ship specimens, whether on pins or in papers, it is better to relax them before they are packed. If the papers and their contents are soft, moist and pliable they can be pressed closely together in the packing box, and if the recipient places the box in the relaxing jar for a day or two he may examine and dispose of them safely. If specimens are to be pinned for shipment the bodies may be placed quite close together if in a fully relaxed condition.

SIMPLE RELAXING JARS.

You must become so accustomed to relaxing lepidoptera that you can do it without the slightest worry or effort. Try all the different methods and use the one which happens to be most convenient. The principle of each method is to surround the dry butterfly with a moist atmosphere. It will absorb moisture so readily that exposed to damp or foggy atmosphere the wings will frequently droop. Scientists often place small specimens on a piece of sheet cork in a saucer partly filled with water and covered with an inverted bell glass receiver. Papers may be gently laid upon the cork, pins containing insects may be stuck into the cork. A few drops of carbolic acid placed in the water will keep away mold. A stone or earthen-ware crock with a close-fitting cover makes an excellent relaxing jar. Cover the bottom of the crock with two or three inches of moist sand, and on this lay a piece of sheet cork or blotting paper to hold the specimens. A metal box or tin can with a cover that fits moderately tight will answer instead of a crock. An old wash-boiler containing three or four inches of damp sand is my favorite relaxing "box." If the cover does not fit securely I place over it a wet blanket. Over the sand is placed a layer of cork-linoleum in which specimens may be pinned or upon which papers or open cigar-boxes containing insects may be placed. The wet blanket may be placed over a

crook, tin can, or any relaxing contrivance, its advantage being that it can be kept quite wet. The sand should never be too wet, drops of moisture will accumulate on the top of the jar and fall directly on the papers. Specimens may become spoiled if they are "soaking wet." Blotting paper may be used to absorb excessive moisture. If you were to plunge papered specimens in warm water or steam them you would undoubtedly relax them quickly but you would surely spoil a large proportion of them. Let them absorb moisture slowly and they become soft and pliable without injury to their delicate plumage.

RELAXING IN DAMP CLOTHS.

Take a bath towel, a sheet or a soft blanket, saturate it with water in which you have placed a small quantity of carbolic acid, wring it out thoroughly, fold it twice lengthwise and then fold it back and forth upon itself three or four times; between the heavy folds gently place your papered specimens. This is the easiest, quickest, most satisfactory relaxing method ever discovered. If the sheet gets dry before the insects are softened, and it probably will, sprinkle water upon it. Do not pour water upon it nor get it too wet or you will be apt to ruin some of the delicate colorings. Simply keep it damp until the specimens are exactly in the right condition for spreading. This will usually be quicker than if you placed them in a relaxing jar, and after the second day you can open the papers and test the rigidity of the butterfly by squeezing the sides of its thorax, beneath the wings, with the jaws of the pliers. If the wings do not open readily put the paper back in the damp cloth. Never try to spread butterflies or moths which are not perfectly relaxed, yet do not let them relax longer than necessary, else the wings will be likely to drop off the bodies.

GUARDING AGAINST MOLD.

You must constantly guard your specimens against mold while they are relaxing. It will form quickly, spread rapidly and will speedily ruin them. A teaspoonful of carbolic acid placed in the water which moistens the sand or in that which saturates the sheet is a preventative against mold. Formalin and other disinfectants are used, but carbolic acid is best. Scald the sand occasionally and bake it in an oven. Boil the sheet frequently. Cleanliness counts. So far as I can learn mold is generally considered fatal to perfect specimens, but I have discovered that very moldy insects may be restored to passably good condition by soaking them in gasoline for several days. If any of my readers know of other methods of removing mold I would be grateful for the information. In olden times, before the efficacy of carbolic acid was understood, entomologists tried to prevent mold by having an open tube in the side of the relaxing box to admit a current of air. The tube was about half an inch in diameter and slanted upward at an angle of forty-five degrees from the outside to the inside of the box. It is said to have worked fairly well.

REPAIRING SPECIMENS.

Slight injuries to specimens may often be remedied. I unhesitatingly advise you to throw away a worn or battered specimen whenever you come across it, if it be of a common variety. It is a waste of time to bother with worthless, damaged moths and butterflies. A very poor specimen may be kept until a better one can be obtained, but this is about the only exception to the rule. You will

frequently break an antennæ or find a split or slightly torn wing during the process of spreading or in handling an insect and this can generally be repaired. Gum tragacanth mixed with water until it is of the consistency of jelly is about the best thing that can be used. Be very wary of glue, patent preparations and gum arabic. I am well aware that each scientist has a particular favorite glue which he uses to mend specimens, but, until you are sure that you have found something better, use gum tragacanth. Apply with a soft camel-hair brush along the parts to be joined. Experts take portions of wings from a badly damaged insect and with them mend holes in the wings of one they wish to preserve. It will be some time before the beginner can do this, but he should always try to repair slight injuries. Each pupil is advised to practice the art of repairing specimens.

GOOD PASTE A NECESSITY.

The pasting of sheet cork or cork-linoleum in cigar boxes, the lining of boxes with some neat paper, the fastening of labels on bottles, jars and test tubes, on boxes, barrels and breeding cages requires the frequent use of a good paste. Common flour paste will answer, especially if it contains a little alum to keep it from spoiling. The white of an egg forms an excellent paste in an emergency. There has recently come into general use among paperhangers a dry, powdered paste, which can be mixed with either hot or cold water and is ready for instant use. The Standard Wall Paper Co., 719 Mission Street, San Francisco, California, sells this powder under the name of "Standard Sticko Paste." It sells for a few cents per pound (I buy ten pounds for eighty cents) and is such a fine paste and so easily prepared that I cordially recommend it. The best library paste is not superior. It has the sticking qualities of glue and can be prepared in a moment in any desired quantity. You can probably get it of any paperhanger or wall paper company.

PRONOUNCING THE NAMES.

I wish I were gifted with the power to help you surmount the bugbear of the awful names assigned to plants and insects. Every one shrinks from the attempt to pronounce a foreign word with which he is unacquainted. Many a pupil gives a gasp of horror at the sight of the food plant charts and flees in terror from the further study of entomology. If it is any consolation to you, I can positively assure you that you can come as near pronouncing these names correctly as do the majority of so-called scientists. The wisest of them differ. Half of the learned professors call the beautiful underwing moth "Ca-toc'-a-la" and the other half "Cat-a-co'-la." I like the first name best, just as Prof. Comstock does, but I am not shocked when my friends differ from me. A simple rule for the pronunciation of Latin names is to give each vowel a separate syllable. The accent falls on the syllable before the last (the pe'-nult) unless that syllable is short, in which case it falls on the second syllable before the last (the an-te-pe'-nult). If the next to the last syllable in Catocala is "a" the word should be "Ca-toc'-a-la"; if it is "co" then "Cat-a-co'-la" is proper. As many of the names bestowed on moths and butterflies are almost meaningless, one has frequently to guess at the pronunciation.

WHY NOT USE COMMON NAMES?

Individuals and societies, time without number, have protested against the present scientific nomenclature. In vain have many attempts been made to introduce common names. The result of all these efforts is to make the matter more confusing. I am fully in accord with any movement which will simplify the work of the beginner, but doubt if any one in this century will bring about the adoption of common names instead of the so-called scientific names. You will find it no great task to master all the names you require to know, and, having learned these, you will be quite contented with the present system. It is just as easy to say "Co-li-as eu-rith'-e-me" as "The Orange Sulphur," and you will experience a feeling of comfortable superiority if you master the Latin name. Even if you mispronounce a name, you will meet few scientists who will not give you sympathy instead of criticism.

THE REASON FOR LATIN FORMS.

There is a story in general circulation to the effect that George W. Pullman gave his daughter the task of finding euphonious names for his sleeping cars and paid her one hundred dollars for each name. If you ever studied the names given to these cars you would have been impressed with the care, taste and good judgment displayed in their selection. After a great many thousand names have been selected it must be a rather difficult matter to find others. If you had the task of finding common names for all the butterflies and moths, all the beetles and insects, all the living things in earth, air and sea, all the plants, of everything which now bears a Latin name in the scientific world, and if you were to be paid \$100 per name upon the completion of your job, you would never receive a dollar, for you could not perform the task in a lifetime. Scientists estimate the number of insects in the world at ten million. But supposing a large number of English-speaking scientists succeeded in accomplishing this undertaking, would the learned men of Germany, Russia, Japan and other foreign countries adopt your English names? Would not the people of each country demand common names of their own particular language? Would not this result in a veritable Babel of confused tongues? Were not the scientists wise to select a dead language, the Latin, to supply the form of scientific nomenclature? All nations have accepted this nomenclature, for the learned men of all nations are familiar with Latin. Don't you think you had better give up the idea of substituting "common" names? Don't you think it would be easier to learn the few Latin names which you will require in your business?

CONFUSION OF SYNONYMS AND GENERA.

There are differences of opinion among scientists as to the names which properly belong to certain butterflies and moths. Different names have been assigned to some insects by different men, and confusion arises. Fortunately for the beginner, the names of many species of Lepidoptera are well established and all authorities agree upon them. The difficulties and conflicts which arise regarding the particular name which has priority in the case of certain insects must be settled by the scientists. The Entomological Society of America at its meeting of March, 1914, at Columbus, Ohio, on request from the International Committee on Nomenclature of the Second International Congress of Entomology, named Dr. E. P. Felt and Dr. H. T. Fernald as members to serve on the

American National Committee. This is mentioned to show that the scientific world is actively engaged at the present time on this question of nomenclature. At present distinguished authors frequently give different names to a genus and are not at all in accord as to what should be classed as true species and what merely synonyms. No two books agree. The specific name is of the greatest importance and is the very foundation of nomenclature. The work of the butterfly farmer will be to demonstrate by actual breeding which are true species. Each person who propagates moths and butterflies, however humble that person may be, may assist the scientists in determining the vexed questions regarding species and synonyms. The name of a genus has not the value that it will have when the International Congress gives us a list of standard generic names.

ENTOMOLOGICAL WORKS.

I have recommended to beginners W. J. Holland's "The Butterfly Book" and "The Moth Book." They are within the means of every student and reproduce in colors a vast number of butterflies and moths. The author does not claim that his works are perfect, but they enable the beginner to correctly name a large proportion of the species he encounters. "The Butterflies of the West Coast," by W. G. Wright, price \$7, has plates which sometimes give better representations of western diurnals. If money is no object and one desires illustrations of exotic species as well as American, by all means subscribe for "Seitz's Macrolepidoptera of the World," a work, which when completed, will consist of 16 volumes, containing about 485 parts, with 1,000 well executed colored plates and about 40,000 figures. Even with this great work one cannot, without special scientific knowledge, hope to name specimens with certainty except those of the best defined species. This can only be done by comparing each specimen, not only with the plate, but with its exact description. How foolish it would be for me, a beginner, to recommend such costly works to my correspondents who are beginners. These lessons are nothing if they are not plain, simple instructions for people who wish to master the rudiments of butterfly farming, and to these people there is nothing better in the market than Dr. Holland's books. If you can obtain a copy, by all means procure Dr. Harrison G. Dyar's "List of North American Lepidoptera." It is doubtless the best authority in this country, but it is out of print and hard to obtain. I am indebted to A. N. Caudell, of Washington, D. C., for the only copy I have ever seen. It gives in condensed form a catalogue comprising 6622 species of North American Lepidoptera.

PRICES OF TRUCKEE LEPIDOPTERA.

In the April number of *The Butterfly Farmer* I stated my terms for Truckee lepidoptera. I tried to make my offers very plain and am happy to state that I have received checks for a considerable amount from purchasers who were glad to accept my proposition. I am surprised, however, that some of my best friends have utterly failed to grasp my meaning and persist in sending me orders for certain rare species which they desire, and want them at five cents apiece. I am not selling Lepidoptera at five cents per specimen unless the purchaser takes all the species that I have to offer, rare and common. I am aware that my way of doing business is decidedly novel, and I do not blame any one for thinking that I would be apt to rush upon them all my common species without giving them all the rare ones. I wish to say emphatically that I accept no orders for rare

material only. By mixing the rare species with my commoner kinds of moths and butterflies I can dispose of all at five cents each. When the time comes that dealers will not accept my terms as advertised I will probably alter the terms, but I am happy to state that I am receiving some very large orders upon my own terms as published.

ADDITION TO LIST OF FOODPLANTS.

Ida M. Corwin, Redwood City, Cal., sends the first addition to the food-plant list of butterflies. She writes that she has reared *Melitæa wrighti* Edw., on *Castilleja latifolia*. This plant is called The Indian Paint Brush in the Wild Flowers of California, by Mary Elizabeth Parsons. Mrs. Corwin adds that the larvæ will eat *Castilleja foliolosa*, but prefer *latifolia*. I am very glad to have one of my pupils add the first name to the foodplant list of the butterflies whose food plants have hitherto been unknown. Every time a caterpillar is found upon a plant the fact should be recorded, and when the caterpillar has passed the pupal stage and becomes a butterfly, if its foodplant has never been announced, the discoverer has added something to scientific knowledge.

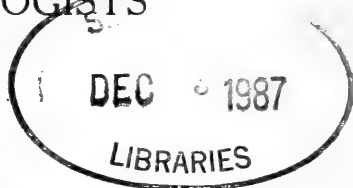
N. B.—ALL SUBSCRIPTIONS DURING THE YEAR WILL BEGIN WITH VOL. I, NO. 1.

Address all letters: (MISS) XIMENA McGLASHAN,

Truckee, California.

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AMATEUR ENTOMOLOGISTS



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OSCAR HAGEN.

Many of my pupils have sent me their photographs and I wish all would do so. The beautiful side of entomology, which the scientists have almost wholly forsaken, appeals very strongly to young men and women and many beginners are making a success of butterfly farming. Among the many photographs the above is selected as a sample.

Oscar Hagen, 1448 Lincoln St., Salt Lake City, Utah, was born at La Crosse, Wisconsin, December 19, 1888, and is a descendant of the famous Norsemen of Norway. He is a High School graduate, is working with his father, who is a contractor and builder, and helping to support the family of nine children. Beginning with the circular course of instruction and taking the correspondence course, he has made great progress in entomological work. Devoting all his spare time to butterfly farming, he writes that he has received orders for everything which he can collect and rear during the present year. He does not neglect his avocation, but is becoming an enthusiastic entomologist. It is the esthetic side of the business which appeals to him, but he writes that incidentally the proceeds of his work will easily supply him with spending money.

DR. EDWIN C. VAN DYKE.

Dr. Edwin C. Van Dyke was born in Oakland, California, in 1869. His parents were among the early pioneers of California. From his mother he inherited his love for Natural History and from both his parents a love for the "out-of-doors." His boyhood was spent on the outskirts of Oakland, where his leisure time was about equally divided between the usual boyish sports and

roaming the fields on collecting tours. He collected about everything at first that a healthy boy could collect. During his late Grammar and High School days he began to correspond with various boys and some few scientists in the East and abroad, and from the latter secured detailed information with regard to the preparation of specimens and was assisted by them in naming his captures. While in High School he moved to Los Angeles and came in contact for the first time with a real Entomologist, Mr. D. W. Coquillett, who assisted him in various ways, particularly by letting him name his beetles by the aid of the scientist's specimens, most of which had been carefully named by Dr. George Horn. They took many field trips together and Mr. Coquillett presented him with numbers of specimens from his collection. Mr. Henry Ulke of Washington about this time became interested in him, named many of his specimens and received in return from him and his California friends large numbers of those species which have since been listed in the Ulke collection.

Entering the University of California in 1889 he was fortunate in being able to take certain courses under Professors John LeConte, Joseph LeConte, E. W. Hilgard, Edward Green, Wm. E. Ritter and C. W. Woodworth. Here he also came in contact with J. J. Rivers, who was then in charge of the University Museum, who took the greatest interest in him and aided him in a thousand and one ways. After graduating from the University he entered Cooper Medical College in San Francisco and graduated in 1895. Enlisting upon a hospital service which lasted several years he afterward successfully engaged in private practice. In 1912 he was induced to abandon his profession and enter College work and devote all his time and attention to Science.

During all these years he kept up his entomological studies, spending all of his vacations and spare time in the field. He met Mr. Charles Fuchs about 1896 and Dr. Blaisdell in 1899, and these two have been his close friends and entomological associates ever since. In 1901-1902 he collected in various localities from Massachusetts to North Carolina and had an opportunity to meet many of the eastern entomologists. With the exception of this one year his work has been confined to the Pacific Coast. He has collected in the Aleutian Islands, in numerous places in Western Washington and Oregon, and with but very few exceptions in every part of California. The present summer he will spend in the western part of Washington and Oregon and on Mt. Shasta.

At first he devoted quite a good deal of his time to Lepidoptera, but during the last twenty years has concentrated upon Coleoptera, simply keeping himself informed in a general way with regard to the other orders. As a result of collecting extensively, exchanging a great deal, purchasing and securing through friendship large amounts of material, he possesses quite a large collection which is particularly rich in such families as the Carabidæ, Elateridæ, Buprestidæ and forest Coleoptera. While he has written far less than his friends would wish, he has supplied both material and notes for many years to other workers. In the future he hopes to make more personal use of his material. The subjects in which he is most interested are geographical distribution and the factors which influence it, certain other correlated subjects as variation, the systematic study of the Carabidæ, Elateridæ, etc., and forest Entomology. Since 1904 he has been in charge of the Entomological department of the California Academy of Sciences. He has been connected with the Department of Entomology of the University of California since 1913. For many years he has been prominently connected with various scientific societies and is universally recognized as one of the leading Entomologists, not only of California, but of the United States.

ADDITIONS TO FOODPLANT LIST.

A. N. Caudell, the distinguished Entomologist of Washington, D. C., has devoted fifteen or twenty years to the preparation of a work covering the life history of Lepidoptera. Associated with the Bureau of Entomology, having access to the exhaustive collection of Entomological works in the Government libraries, and enjoying the intimate friendship and cordial assistance of the learned scientists of America, Mr. Caudell has had unlimited facilities for the preparation of his magnificent work. It will consist of over six hundred pages and embody all scientific data to date. A feature of the work will be the careful preparation of lists of foodplants of the larvæ of Lepidoptera. The book will be published in a few months. It will be a most valuable contribution to the entomological literature of America and there is at the present time an urgent demand for just such a publication. With unprecedented generosity, Mr. Caudell cordially helped me in the preparation of the foodplant charts and upon receipt of the May number of *The Butterfly Farmer* he carefully went over the manuscript of his work and sent me all the foodplants it contains of the missing species on the charts. The gratitude of each pupil and of each reader who is interested in rearing larvæ is due to Mr. Caudell for this rare act of kindness. If other Scientists would take the trouble to make such additions to the foodplant list as they have learned from observation and actual experience a revised edition of the charts could be issued which would be up to date. I earnestly request the co-operation of all who are interested. If you find the larvæ of any of the missing numbers the plant upon which they are feeding can be named for you and you will have added an atom to scientific knowledge. When Mr. Caudell's book is published it will be a necessity in every working library in the entomological world. His contribution of missing foodplants is as follows:

- 43. *Synchlœ olympia* Edw. *Arabis lyrata*.
- 50. *Synchlœ pima* Edw. *Turritis* (?)
- 67. *Eurymus hartfordii* Hy. Edw. *Astragalus crotalaria*.
- 69. *Eurymus christina* Edw. White clover.
- 71. *Eurymus interior* Scud. *Desmodium*, *Salix*, *Vaccinium*.
- 75. *Eurymus nastes*, Bd. *Salix*.
- 85. *Eurema euterpe* Men. *Cassia chamæcrista*, *C. nictitans*, *C. occidentalis*, *Glycine*.
- 116. *Argynnis callippe* Bd. *Viola*.
- 128. *Argynnis eurynome* Edw. *Viola*.
- 186. *Charidryas ismeria* Bd. and LeConte, *Helianthus trachelifolius*, Ivy.
- 190. *Phyciodes batesii* Reak. *Compositæ*.
- 191. *Phyciodes pratensis* Behr. *Carduus*.
- 210. *Polygonia silvius* Edw. *Azalea occidentalis*.
- 240. *Basilarchia floridensis* Streck. *Populus*.
- 243. *Limnitis bredowii* Hub. *Quercus*.
- 247. *Chlorippe alicia* Edw. *Celtis occidentalis*.
- 263. *Cercyonis sylvestris* form *charon* Edw. *Poa pratensis*.
- 280. *Coenonympha elko* Edw. Grass.
- 294. *Æneis tarpeia* form *alberta* Elwes, Grass.
- 295. *Æneis norna* Thun. *Sedges*.
- 313. *Chrysobia mormo* Feld. *Eriogonum*.
- 340. *Thecla californica* Edw. *Salix*.
- 365. *Calycopis cecrops* Fab. *Cotton*.

372. *Incisalis iroides* Bd. Apple.
390. *Gæides dione* Scud. *Rumex longifolius*, (Dock.)
397. *Epidemia dorcas* Kirby, *Potentilla fruticosa*.
411. *Cupido pembina* Edw. *Vicia cracca*.
419. *Nomiades couperi* Grt. *Vicia cracca*.
420. *Nomiades lygdamas* Doub. *Lathyrus ochroleucus*. L. carolina, *Vicia carolina*.
427. *Rusticus enoptes* Bd. *Eriogonum umbellatum*.
479. *Oarisma garita* Reak. *Poa pratensis*.
482. *Poanes massasoit* Scud. *Gramineæ*.
484. *Atrytone hobomok* Harris, Grass.
487. *Erynnis comma* var. *manitoboides* Fletch. and *manitoba* Scud. Grass.
501. *Erynnis attalus* Edw. *Gramineæ*.
523. *Thymelicus cernes* Bd. & Le Conte, *Gramineæ*.
535. *Euphyes fusca* Grt. & Rob. *Apios*.
543. *Lerema hianna* Scud. *Gramineæ*.
544. *Oligoria maculata* Edw. *Gramineæ*.
549. *Prenes errans* Skin. Grass.
555. *Limochroes bimacula* Grt. & Rob. *Gramineæ*.
556. *Limochroes pontiac* Edw. *Gramineæ*.
559. *Limochroes dion* Edw. Grass.
560. *Limochroes arpa* Bd. & Le Conte, Saw Palmetto.
564. *Phycanassa viator* Edw. *Gramineæ*.
569. *Phycanassa aaroni* Skin. Grass.
575. *Erycides batabano* Lefebvre, *Rhizophora mangle* (Mangrove).
576. *Erycides amyntas* Fab. *Piscidia erythrina*.
600. *Thorybes mexicana* Herr.-Schaeff. *Trifolium monanthum*.
622. *Thanaos ausonium* Lint. *Leguminosæ*.
628. *Thanaos terentius* Scud. & Burgess, *Cupuliferæ*, *Leguminosæ*.
629. *Thanaos proprius* Lint. *Quercus*.
634. *Thanaos funeralis* Scud. & Burgess, *Hosackia glabra*.
644. *Hesperia centaureæ* Ramb. *Mentha*.

Henry Skinner, M. D., Sc. D., in charge of the Academy of Natural Sciences, Philadelphia, Pa., writes: "Quite a number of the species you mention in your Butterfly Farmer for May have known foodplants recorded in the literature. I have reared the first stages of *Argynnis nitocris* Edw. on violets in Sapello Canyon, San Miguel County, New Mexico. *Neophasia terloo* Behr. feeds on *Arbutus*. *Pamphila hobomok* Harris and *panoquin* Scud. have been reared on grass. *Lycæna xerces* Bd. is the same species as *antiacis* Bd. and *polyphemus* Bd., and feeds on *Lotus glaber* and *Lupinus arboreus* and also eats *Lupinus micranthus* and *Astragalus menziesii*. *Chrysophanus dione* Scud. feeds on *Rumex longifolius*. There are a good many more known, but I cannot take time to grub them out of the literature. A number have been published since my Catalogue (1898) and supplement (1904). In most cases reference to the life history is indicated by an asterisk. I am sending you copies of these.

I am writing revision of the *Hesperidæ* and if you wish any species named I will be glad to name them. I want *Thanaos* particularly at the present time. I will be pleased to have you state in *The Butterfly Farmer* that I will buy butterflies and also name them gratis. I think Mr. W. S. Wright of San Diego may have reared *Chrysophanus hermes* Edw. If I happen to note more foodplants I will let you know of them. I would like to see a specimen of your new mount when you have it in shape. There is always a chance for improve-

ment. At present museums must use pins, as it is frequently necessary to get at the specimen to study the minute anatomy. When this is not desired by the collector a new method would be a desideratum. The Denton and Riker are artistic, but have faults otherwise. We use these methods in our museum for display purposes for the public."

Has completed its sixth volume with a sixty-four page number, beautifully illustrated with cover in three colors.

THE GUIDE To NATURE

Sound Beach, Conn.
Edward F. Bigelow, Editor.

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CORRESPONDENCE COURSE IN ENTOMOLOGY.

Conducted Under the Auspices of The Agassiz Association.

Lesson XI. Miscellaneous.

DR. HOLLAND ON FOODPLANT CHARTS.

Dr. W. J. Holland, Director of the Carnegie Museum, Pittsburgh, Pennsylvania, writes: "Your very kind lines are before me, and I thank you for the printed matter which accompanies your letter. I assure you that you have done nothing wrong whatever in copying into your circular the names of the foodplants of the various lepidoptera which you give, and I regret very much that my book gives as little information in reference to the foodplants of many species as it does. You are certainly doing a very good work in endeavoring to inform others as to the progress made in reference to this branch of knowledge, and I promise you that it will give me great pleasure to go over the list carefully when I have time to do so, and with the help of my assistants to try to fill up some of the gaps, which I think we can do. One of my friends here has been very industriously breeding larvæ for the last four or five years, and I think we can obtain from him a good deal of valuable information, more especially as to the habits of the larvæ of the moths."

HOLLAND'S BOOKS.

Dr. Holland adds: "Your kind recommendation of the books which I have written, I assure you I sincerely appreciate. At the time that I undertook the production of these two volumes, there was absolutely nothing easily accessible to beginners in this country, which contained in compact form, accompanied by good illustrations, that which the beginner always desires to know in reference to such things. It may interest you to know that many thousands, both of the "Butterfly Book" and of the "Moth Book," have found their way into the hands of nature-lovers in this and even in other lands, and hardly a week passes in which I am not requested to give information to beginners who are interested in our favorite science."

COMPLETING MONOGRAPH OF CATOCALAS.

Dr. J. H. McDunnough of Decatur, Ill., who is associated with Dr. Barnes, writes: "We have been approached by the trustees of the American Museum of New York with a view of completing the Monograph of the Catocalas begun by Mr. Beutenmueller, but relinquished on his retirement from the Museum. In order to do this satisfactorily it will be necessary to secure the co-operation of collectors all over the country to obtain for us fertile ova from living females, in order that we may study the early stages and have colored figures made of the mature larvæ. Try and secure for us several hundred eggs from every species in your locality and mail us the paper bags with the females inside, when dead. The ova hibernate so there is no danger of hatching on the journey. We will pay at the rate of \$1.00 per hundred for all eggs received up to 200 of each species. A single female will lay from 100 to 600 ova. I trust you will do your share toward making this Monograph a success."

HOW TO TELL SEX OF CATOCALAS.

Dr. J. H. McDunnough says: "Collectors tell us they have difficulty in determining female Catocalas. The male has the abdomen narrow, pointed, and ending in a strong tuft of hair. In the female the abdomen is stouter, with scarcely any hair-tuft, often with a keel-shaped process on under-side near extremity (vide *C. relictæ*), and the end of the ovipositor may often be seen protruding as a small circular tube. An absolutely certain method of determination is to examine the frenulum or spine at the base of the hind wings, which serves to fasten them to the fore-wings; in the male this is always a single stout spine; in the female it consists of two or three slender spines."

CARE OF CATOCALA LARVÆ.

R. R. Rowley, Superintendent of School, Louisiana, Mo., says: "I keep Catocala eggs in a cool place until the leaves are bursting out in the Spring, say early in April, lest the little larvæ appear before their food and die, as I have had them do when they hatched in March. In early April I place the eggs on white paper on the inside of a tin lid to a jelly glass, inverted, and when I find they are hatching I cautiously open the lid and place a tender leaflet inside. You will find that by keeping the glass inverted it will be easier to remove and renew the food. I wouldn't advise you to try to remove the food for several days, till the tiny creepers become less active. Fresh leaves, however, can be inserted every few days. After the larvæ have passed the second moult, in about six or eight days, I transfer them to roomier quarters, where I keep them till they pupate. I use the Stickney glass cigar jars with metal lids. These jars hold over half a gallon, are six inches in diameter, and the open end is as wide as the rest of the jar. These I keep right side up, with a paper on the bottom to absorb moisture, and clean them out every second day, sometimes every day, and replenish the food-supply as often as it needs renewing. Never let the leaves wilt. Open the jar two or three times a day and with a palm leaf fan change the air in them. I also change the air in the jelly glasses in the same way, only I fan lightly to keep from blowing the little crawlers away. I usually double the paper on the bottom of the jars, or drop extra pieces of paper in when the larvæ are about ready to spin, so that they can crawl under the paper and spin their cocoons. I never even dampen the food with the young larvæ, lest they drown in the drops of water. With larvæ half-grown or larger I often dip my fingers in the water and flirt the water into the open jar among the leaves. I have reared larvæ to pupation without ever giving them water other than that in the leaves they eat. It takes from five to seven weeks to bring Catocala larvæ to pupation and then another twenty to thirty days to mothhood. The larvæ usually moult five times, sometimes four. Always place your pupæ so they can climb up some rough (board, paper or cloth) surface, when they emerge, so that the young moth can hang body down, and expand its wings, else it will be a cripple. Larvæ of hawk-moths and the silk-worm family may be reared directly in the Stickney jars. To insure the health of the larvæ, pure food should be always in the jars and the air changed often with a fan. You should be able to get the Stickney jars from the cigar stores, as they cannot be used again by the manufacturers. There is also a brown glass jar, of less size, used for cigars."

DETERMINING SEX OF MOTHS.

E. J. Smith, Sherborn, Mass., writes: "In your directions for determining the sex of lepidoptera you do not mention the frenulum. This is in some moths a much surer way than any other except dissection. A few family of moths do not have it, but nearly all do. It is always single in the male and composed of from two to six or more bristles in the female. It is sometimes concealed so that a little denuding is necessary. To do this I use a small paint brush about one-sixteenth of an inch in diameter, the bristles of which have been cut off so as to make a rather stiff and blunt end. With this I rub the under side of the wings gently, close to the body, until the frenulum is exposed, and then with a lens of moderate power it is easy to see whether there is more than one bristle."

SUNSHINE AND EGG LAYING.

Some species of lepidoptera will not oviposit without being in the sunshine. This is especially true of some of the butterflies. Remember this and sometimes experiment by placing the butterfly over her foodplant in a net or cage which is exposed to the rays of the sun. As a rule, however, lepidoptera should not be exposed to the direct glare of the sun.

ARTIFICIAL LIGHT AND EGG LAYING.

The introduction of a gas or lamp light to an apartment in which a female is ovipositing will, in most cases, stop the process, and I have found this to be especially the case with *Catocalas*. There are species, however, which may be induced to oviposit by being placed in the light. The plan of actually squeezing out eggs from the body of a refractory female is recommended as a last resort to induce her to commence laying.

FERTILE AND INFERTILE EGGS.

Dr. Knaggs says: "If an egg, from having been yellow or orange, change color to any of the tints of pink, rose, or red; from having been of reddish color to any hue of lavender, lilac, purple; from white, drab, or cream-color to any shade of brown or lead-color; from green to red or lurish purplish; or if an egg becomes black or uniformly darker, or if it gets symmetrically marked, spotted, banded, or ringed, flatten or change form without shrivelling, the chances are that it is fertile, and that the natural changes are going on in the enclosed larva; but if, on the other hand, the egg should show transparency at one point and opacity at another for any length of time, or should go over its proper time of hatching, or should curl or collapse, it may almost certainly be considered either that the egg is unfertilized or that the contents have perished; for though the soft eggs of some species do shrivel to a certain extent, even though perfectly impregnated, it is assuredly, as a rule, a bad omen. Of course the above tests are inapplicable to eggs which have rigid, opaque, and colored shells, but even here an adept will detect a difference between a fertile and infertile ovum. It will, however, be best for the collector to keep his eggs until he is quite sure about them one way or other; remembering that the ova of the same species at one time may hatch in the autumn, and another may lie over until spring."

WHEN EGGS HATCH TOO EARLY IN THE SPRING.

Hibernating eggs frequently hatch in the early spring before the leaves of their foodplant have appeared. In such cases the unopened buds of the plant may be gathered and split, and may be successfully offered as food for the young larvæ. Care must be taken to renew the buds frequently, as they dry very quickly.

USE THE BREATH IN SPREADING.

In spreading a butterfly or moth if the wings stick together blow against them with the breath, gently or forcibly, as may be required. If after breaking down the wings with the forceps they still stick straight up over the back, blowing against them tends to force them down into position. You will find the breath an important factor in the work of spreading.

WHEN FLIES ARE LOOSE UPON PIN.

Frequently an insect is not firmly held to the pin and will turn upon it when you attempt to place it in the box or cabinet. This is very annoying, as the wings will not remain in the position desired. Put a little drop of gum tragacanth around the pin close to the underside of the body and the trouble will be remedied.

TO OBTAIN HYBRID EGGS.

There is an ever-increasing demand among scientists for the imagoes which are known as hybrids, the result of eggs which have been laid by a female which has mated with a male of a different species. When it is desired to obtain hybrid eggs the females of the first species should be placed in a cage with several males of the second species, while in a separate cage should be a female of the second species with a number of males of the first. The two cages should be kept close together, side by side, so that the inmates are separated only by the netting which covers the cages. A correspondent recommends a slightly different method, which I have tried with success. Divide a cage with a horizontal partition of netting, on the lower side of the partition place a number of males and on the upper side place a female of the same species. After a few hours remove the female and introduce among the males a female of the other species. Your experiments may result in many failures, but if you succeed in obtaining fertile hybrid eggs you will be amply repaid for your trouble.

A SWEETENED SPONGE AS FOOD SUPPLY.

A sponge moistened with honey and water will satisfactorily supply food to imprisoned females during the egg-laying period. It may be pinned to the side of the cage and is said to be quite as good as dried apple soaked in honied water. Females, having mouth organs and requiring food, may sometimes be induced to eat by placing the food in front of her palpi and then gently blowing toward her. The odor will generally cause her to unfold her tongue and partake of the nectar.

SEARCH FLOWERS.

I have not happened to find the statement in books, but many rare moths can be found on flowers at night. The flowering shrubs or clusters of flowers which attract diurnals in the daytime will be sure to attract moths at night. Begin watching these flowers in the early twilight and use your net until it becomes too dark, then trust to your carbide lamp and cyanide bottle. The trick of the work consists in the fact that after dark you must search the flowers thoroughly. I have had pupils report that they could find no moths on a given bunch of flowers, when a careful, painstaking search revealed several specimens.

Each particular flower must be carefully examined. You may hold the light fairly close, for during the night hours the moths are well hidden and if you should happen to disturb them they will fall to the ground and may be picked up with the forceps. They seem to be asleep during the later hours, but for the first two hours or more of darkness are feeding. Rare specimens can thus be obtained which do not often come to light or sugar. To take them place the open mouth of the bottle just under them and flip them into it by touching them on the head with the forefinger. Sometimes you may bend the flower stem and insert it with the moth directly into the bottle. The catkins of the willow, or what we children called "pussy willows," are the first flowers in Truckee, and there are rare moths which can always be found early in the Spring fluttering about and sipping the willow blossoms. They can be taken with the lamp and poison bottle, or sometimes with a hand net. Their flight begins at dusk and lasts a couple of hours.

TWILIGHT COLLECTING.

Many of the Sphinx or the Hawk-moths, visit the honeysuckle and other flowers just at twilight. They are sometimes called "Humming-bird Moths," and every child who is familiar with flowers has seen them feeding about dusk and may have mistaken them for humming birds. The *Hepialus* family or the species of it with which I am familiar can only be taken during the time between the evening twilight and dark. As the dusk is deepening the males may be seen darting swiftly two or three feet above the grassy meadows, searching for the wingless females, which are concealed among the grass roots. You must take them on the wing and must handle the net with quick, expert strokes. While pursuing them it often occurs that they suddenly and mysteriously disappear, seeming literally to "vanish into thin air." In reality, they have darted down into the grass, but the movement is so swift and unexpected that in the semi-darkness it is indistinguishable.

BEATING AND SWEEPING.

Entomological houses advertise beating nets and sweeping nets. Beating bushes and branches of trees with a club, either day or night, and sweeping grass and low shrubs, yield large quantities of larvæ, beetles and insects. Papers or a sheet can be spread upon the ground under the branches while beating or a large tray or shallow paper box may be used. Just before sunset is an excellent time to sweep the weeds and shrubs, especially on warm evenings.

BEST CALIFORNIA COLLECTING GROUNDS.

Dr. William Barnes, of Decatur, Ill., writes:

"I think one of the best collecting places in California would be around Tehachapi Pass, Havilah, Kern County, and from there on up into the headwaters of the Kern River. At Tehachapi Pass, if you strike it right, you would get *Lycæna Clara* and *Argynnis Atossa*. These are found nowhere else in the world, and *Atossa* especially you ought to sell at a good price. Another good place would be the high Alpine prairies above the Yosemite. *Colias Behrii* is found there and nowhere else. You could find the proper locality there by inquiring where old man Lambert used to live. He used to have a cabin up there and was found dead in his cabin, supposed to have been killed by the Indians. Everybody in that region knows of him. Calo-

saturnia mendocino is another very desirable thing which should be very easily bred, if one could find it. As far as I know, there has been none of them turned up for twenty-five or thirty years. But that is probably because no one has collected in the right locality. I think it is found north of San Francisco, in Mendocino County. Around Soda Springs, Shasta County, ought to be good collecting. It is one of Henry Edwards' old resorts. I am anxious to get things from the Kern River country, the Shasta country, Yosemite region, also down in the Owen's Lake region. Northeastern California is practically unworked as far as I know. If one could find a good locality there, not all desert, he ought to get lots of good things. There has been very little collecting done in Nevada at any time except more or less around Verdi, Reno and Virginia City. A trip down through Virginia City, Goldfield and Owen's Lake ought to bring valuable results if one struck things just right."

FEEDING LEAVES OF IDENTICAL TREE.

When you discover larvæ upon a tree or shrub they will in most cases thrive better upon the leaves of that same tree or shrub than though you substitute leaves of the same kind. If this is not practicable, try at least to obtain leaves from trees or shrubs growing in the particular locality in which the larvæ were found. This rule is not imperative, and in rearing large numbers of larvæ I pay no attention to it whatever. With a particularly rare species feed larvæ the leaves of the same plant upon which they were found.

PENNSYLVANIA LEPIDOPTERA.

Dr. Holland writes: "The butterflies of western Pennsylvania are comparatively few in number, there being only about seventy-five species which occur here. It is not so with the moths. We must have sixteen hundred species of moths in this county, and taking western Pennsylvania as a whole, I have no doubt the number will ultimately be found to reach well above the figure."

PRESERVING LARVÆ.

Dr. J. H. McDunnough of Decatur, Ill., writes: "I would suggest taking fully fed larvæ just as they commence to contract before pupation and placing them for ten minutes in a solution of 6 parts absolute alcohol, 3 parts chloroform and 1 part glacial acetic acid, then transferring to 80 or 90 per cent alcohol which contains a solution of chlorophyll (this latter you can get by crushing leaves in alcohol), this prevents the green color being extracted from the larvæ; place in small vials. We should very much like larvæ of anything you breed."

INCREASING STRENGTH OF CYANIDE BOTTLE—CAUTION.

Alternate layers of cyanide and blotting paper will permit any desired strength of the poison bottle. The addition of Tartaric Acid adds very much to the strength of the poison fumes, for it causes the deadly salt to decompose, resulting in the liberation of hydrocyanic acid. In the use of any form of traps this becomes of importance. Poison labels should be pasted upon each bottle and the greatest possible care should be taken to remove the bottles early in the morning and place them in position late in the evening, using every precaution to place them in safe and secluded places out of the

reach of every person. With proper care poison in traps can be employed with absolute safety. Never inhale the fumes of cyanide. One who fails to exercise the utmost caution has no business to handle such substances. When a bottle breaks it should be thrown into the fire. At all times when not in use it must be kept tightly corked or covered.

EXPERIMENT WITH FOODPLANTS.

A. Walt Pearson, Editor Morning Bulletin, Norwich, Conn., writes: "It has been a fashion among entomologists to keep the science of rearing caterpillars to themselves so they have not been noted for divulging foodplants. Perhaps most of them have depended more upon the net than upon the larval plan for specimens. The rule is to feed your worms upon the food they were found upon. This, however, does not give the best results. I have seen a polyphemus moth found feeding on ferns dwarfed to four inches and fade to a pale gray, and I have fed them on wild cherry to six or seven inches in spread of wing. They also have fed on apple foliage or maple and I once had one with borders of Indian yellow which suggested he might have fed upon bayberry. I had this moth down so fine once I could tell from the color of wild specimens what the larvæ fed upon. I used to dwarf them with unpreferred food and increase their size by keeping them on the foods they loved best. I have grown all the large New England moths from the egg. I once grew some foreign moths Strecker sent me the eggs of on lilac, when he assured me I would fail if I did not have sweet potato vines for them. These were a pink under-wing Sphinx of which I do not now remember the name. If I were younger I should like to operate a farm along the lines you suggest. A chump cannot do it—one must have a real love for Nature and Nature's works to succeed at that. Since I have learned that your father is an entomologist and corresponded with the leading lights of other days, I have a feeling of comradeship for him. He ought to be proud of such a daughter. I shall be glad to aid you in your work in any way I can. You profit by it because you deserve to. May your name be indelibly written upon the Entomological rolls of all time."

EASY WAY TO GET PAPILIO PUPÆ.

Herman H. Brehme says: "To get *Papilio* chrysalids without feeding larvæ is a point that may be interesting to some of your readers. Collectors often find the larvæ of these species abundant, but have already enough work on hand to feed the rarer species. If the collector thinks that the place where the larvæ are is so isolated that there is no danger of another collector coming and picking the larvæ, he can safely let them stay where they are. All that is necessary is to lay heavy paper or small pieces of wood near the bush or tree and ninety per cent of the larvæ will go under these hiding places to pupate. I have done this for many years with good success."

TRY TO LEARN TO IDENTIFY SPECIMENS.

One of the first lessons in my personal instruction class is to teach pupils to determine from Holland's books the common species of moths and butterflies. You will be surprised to learn the great number you can positively identify. You do not need to send away to an entomologist the larger part of the species in your neighborhood. Send only those concerning which you have a doubt. If you know nothing whatever of names compare a specimen

with those on each plate until you find the right one, then write the name on a label or piece of paper and pin it underneath the insect. At first it will be slow work, but you will soon familiarize yourself with the plates and generic names. Suppose, for example, you have a *Junonia coenia* Hubner, you will examine each plate until you come to Plate XX, Figure 7, which is an exact representation of your specimen. Learn to know the names of the species in your collection and repeat them often. If you can write the correct names of the rare species of Lepidoptera you collect and breed, you can sell them, even though you do not know the correct pronunciation of the Latin names.

CAUDELL'S INVENTION FOR MOTHS WHICH DROP.

When sugaring for moths you will observe that many specimens fall from the sugar to the ground and are frequently lost in the grass and leaves. A. N. Caudell of Washington, D. C., on a trip to British Columbia with Dr. Dyar and Rolla P. Currie in 1903 contrived a method of saving these moths, which Mr. Currie described in the Proceedings of the Entomological Society of Washington, as follows:

"A semicircle of springy wire was sewed to the top of a cloth funnel about one foot in diameter, the bottom of which, furnished with a strong elastic, fitted tightly around the mouth of a large cyanide jar of extra strength. On approaching a sugared tree, pole or stump the unwired side of the funnel was made to fit closely around it just below the lower moths. A little jarring and blowing, or a light brushing with the fingers, would precipitate them all into the funnel and down into the cyanide jar below. The jar was then corked and as soon as the moths became quiet they were transferred to a storage cyanide jar and packed lightly between layers of cotton." Mr. Caudell writes me: "This is an excellent piece of apparatus for use in sugaring on a large scale. The spring steel or wire forming the top of the funnel should be a foot or more from end to end when curved, the open gap allowing the funnel to be placed closely to any surface, flat or curved. If the following sugaring mixture be used the moths are usually in such a stupid condition that they will drop helplessly into the cyanide jar fastened at the lower and small end of the funnel. This jar is formed from large-mouthed quinine bottles and a number carried in a canvas apron with various pockets made it very convenient, all the bottles being used in rotation so that the moths in a given bottle were all dead by the time that bottle was used again. A rubber band fastened around the small end of the funnel held the bottle and made it easy to insert and remove them easily and quickly."

MR. COCKLE'S SUGARING FORMULA.

The experiences of the party and the mixture mentioned by Mr. Caudell are thus described by Mr. Currie: "We began sugaring about the middle of June and in that month sugared three times, according to my record. During the first half of July we went out about three times a week and during the remainder of July and in August sugared almost every evening when not prevented by rain. During the early part of summer moths were not particularly abundant at sugar, and 100 or 200 specimens an evening was considered a fair catch. But later in the season the number of moths steadily increased and during August, up to the time we left, 1,000 or 2,000 specimens could easily be taken almost every evening. On one occasion we even exceeded that number and secured 2,330. Species as well as numbers of individuals were

well represented, 75 species a night being the usual average in the latter part of the collecting. Although there were naturally long series of some species, yet of not many did we secure a larger number of specimens than we had use for. Our method of procedure, though probably not essentially different from that of others who sugar for moths, was as follows: About 7 o'clock or 7:30 in the evening we went over the route and put on the "sugar," which, according to Mr. Cockle's formula, was made by heating a mixture of three pounds of sugar and one pound of molasses until thoroughly dissolved, then thinning with beer until of a syrupy consistence and adding a small glass of rum. This was spread by means of a good-sized whitewash brush, upon stumps, fence boards and palings, telegraph poles, etc., along certain roads and paths back of Kalso, usually along a circuitous route which brought us back to the starting point without going twice over the same ground. About 9:30 we started out again, equipped with a lantern, several large and small cyanide jars of good strength, a few vials of alcohol and two large muslin sacks, one of which contained 150 or 200 empty paper pill boxes. The moths were caught on the sugar by clapping the cyanide jar over them and when partially overcome by the fumes they were removed to pill boxes, each moth being put, when possible, in a separate box. Each pill box, as it was filled, was then transferred to the empty muslin sack. Next morning the boxes were opened, male moths removed to cyanide bottles and the females confined in glass jars in order, if possible, to secure eggs from them for life history studies."

A SUGARING TRAP.

It is quite impossible for some of my pupils, especially some of the women, to spend the time and undergo the inconvenience of making nightly trips to sugar for moths. In many localities it is safe to use a poison sugaring mixture which will kill the moths. Take two ounces of arsenic and two ounces of bicarbonate of soda and boil for half an hour in a quart of water. Two table-spoonfuls of this solution placed in the sugaring mixture will poison all the moths that partake of it, and many will drop to the ground. A sheet or newspapers may be used to catch them, but toads and other enemies will destroy so many of them that I recommend the funnel and cyanide bottle described by Mr. Caudell. It is not necessary to state that this poisoned mixture should not be placed on trees where harm could result from the poison. A small splash from a brush on the bark of a tree just above the bag will enable you to secure many moths which are attracted and you can visit your traps each morning and secure them. Mr. Cockle's mixture, or any boiled mixture or cooked compound, lasts longer without drying up and is superior for this purpose. This poison trap is an invention of my own and works well in this mountainous region. I am fully aware that it would not answer in some localities. I paste druggist's "poison" labels on the trees, as I have known of people whose curiosity led them to taste the mixture.

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VALEDICTORY.

The correspondence course was to consist of twelve monthly lessons. This is the last. It was also to include personal instruction by letter regarding any difficulties which pupils might encounter. Those who availed themselves of the privilege of asking advice have sometimes stated that the "correspondence" lessons were as valuable to them as the printed ones. This part of the course has not ended and all subscribers are requested to write me regarding the perplexities of their work, their failures and successes, their discoveries, their wants and especially the material they can offer for sale. The *Butterfly Farmer* will not be issued in future, but all subscribers will distinctly understand that they have paid me for all which I may be able to teach them.

The experiment of teaching butterfly farming by means of the correspondence course has proven a success. I have made no money, but the subscriptions have so nearly paid expenses that I am quite satisfied. I promised, at the outset, to give these lessons without personal remuneration. While attending College it is quite impossible to instruct beginners without asking them to pay the actual cost of their instruction. It is probable that some deserving applicants could not raise five dollars and have failed to receive the help necessary to start them in this enchanting work. I do not know of such a case, however, for I have never refused to mail the lessons because a person was unable to pay the price. On the other hand, I have received many subscriptions from people who entered into the spirit of my work and desired to participate in the good that is being done. They cared really nothing for the lessons, but were pleased to know that someone was trying to assist amateur entomologists. Gene Stratton Porter writes: "In five of the letters that go in my mail bag this morning I have referred people asking questions about moths to you; and this is of almost daily occurrence in answering my mail." I cannot express the warmth of my gratitude to Mrs. Porter and others who thus co-operate with my plans. The subscription price has had the effect of discouraging curiosity seekers who would have absorbed my time and sapped my energies, but in no instance, so far as I know, has it prevented zealous, sincere inquirers from receiving instruction.

There remain unsold a few copies of the lessons, and sets of these are offered at the price of three dollars. Subscribers who have sent five dollars for duplicate sets of lessons in order to have them bound have had two dollars refunded. So long as they last, the twelve numbers of *The Butterfly Farmer* will be sent to any address for three dollars.

To Dr. Edward F. Bigelow, who permitted me to publish these lessons under the auspices of The Agassiz Association, and to the scores and hundreds who have assisted me in their preparation, I am profoundly grateful.

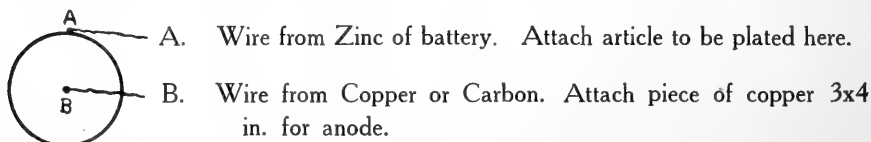
XIMENA McGLASHAN.

METALLIZING FLOWERS AND INSECTS.

A. W. Scott of Edison Park, Illinois, writes: "Some months past I wrote you pertaining to the plating or metallizing of insects, especially butterflies. At that time I was unable to give you an explanation of the process in detail, but after much searching and roaming I happened to find the trail of the man who originated the idea. This I find to be located in the woods of northern Minnesota; however, this is only as it should be; he is home with Nature. I send the formulas just as I received them and hope that you and your pupils may gain some little help from them. The insects cannot be plated so that the natural colors show, but they can be retouched with water colors.

"Formula 1. To one pint of Orange Shellac add one-fourth pint of Wood Alcohol, and mix thoroughly. Attach No. 20 or other small copper wire to article to be plated. If it is a flower, run wire through the stem into flower, bend over slightly and pull back into flower. Now dip into above solution for one minute. Remove and shake off surplus shellac, then fill an ordinary insect powder gun with gold bronze powder and blow or spray over shellacked surface of article to be plated. Be sure it is well covered with powder, otherwise it will not plate.

"Bath Suitable for All Metallizing Formulas. Dissolve one pound of Blue Vitrol in two quarts of warm water and add two ounces Sulphuric Acid; add slowly, stir constantly. Place this bath in a jar (it must be a non-conductor of electricity), and wire batteries as follows: Two cells of Lalande (or Columbia), or one of stronger type will give good results. Connect several feet of fine iron wire between zinc of battery and article to be plated, for resistance, and if deposit is loose or grainy, use more resistance wire; if slow, less wire. A slow deposit is best, as it finishes with a satiny appearance. Leave articles in this bath from twelve to twenty-four hours, or until plating is heavy enough. If upon removal there are spots on articles that are not plated, gild them carefully and return to plating bath until plated. If it is a flower and the petals are loose, solder them together with soft solder and then solder them on pin, afterward. The soldering must be done after the flower is plated, of course. Always copper-plate over solder if you wish to gold plate afterwards. Articles may now be finished with such plating or by bronzing with gold or silver or by oil painting or enameling. To produce a metallic finish in colors, use combinations of gold and silver for green, gold and copper for red, and for rose pink use a flash of silver, then a flash of copper, alternately. These colors take considerable practice to master, and no definite directions can be given.



"Formula 2. Make a thin solution of Shellac by adding wood alcohol. Place articles on wires as in formula No. 1 and spray with this solution, using common oil throat spray. Now make a solution by dissolving Nitrate of Silver Crystals in liquid composed of six parts 95 per cent Alcohol and four parts distilled water. Dip articles in this liquid for a moment, then remove and expose to fumes of Sulphureted Hydrogen. For small articles taken any tumbler with

tin cover and punch hole through cover to run wire through. Now pour an ounce or so of diluted Sulphuric Acid (1 part acid, 8 parts water) in the tumbler and add three or four pieces of Iron Sulphuret as large as a pea. Suspend article just above this liquid by running wire through hole in cover and bending over. Leave exposed to these fumes from five to ten minutes, or until they turn to a silvery gray. If they are not evenly covered, remove and dry, then dip again in silver solution and return to fumes. When articles are evenly covered with a silvery gray finish they are ready for bath.

"Formula 3. Dip article to be plated in thin solution of shellac or mucilage, let dry until tacky; then cover as evenly as possible with finely powdered graphite, when dry polish gently with a soft brush. It is then ready for the bath.

"Formula 4. Immerse the article in a 10 per cent solution of Silver Nitrate in alcohol and dry, then dip in a 10 per cent solution of Yellow Phosphorus in Carbon-di-Sulphid. This will form a metallic coating which may be plated over. The ingredients of this solution are very inflammable and should be handled out of doors only, and never near a light or any fire. Keep Phosphorus under water.

"Formula 5. Dissolve Silver Nitrate Crystals in several times their weight of distilled water and add ammonia until the precipitate which forms at first is re-dissolved. A second solution is now made of Formaldehyde in three times its weight of distilled water. Now dip article in ordinary collodion and dry. Now mix the two above solutions in the proportion of one part of the first to two parts of the second (by weight) and apply at once to the collodioned article. In a few minutes the silver will be reduced to a metallic state and may be plated over.

"I find Formula 1 the best for ordinary work and would advise a beginner to use it first as the copper plating will spread more rapidly over the bronze powder than on most of the others; this will give a better chance to get resistance and batteries right. Formulas 2 and 4 are especially good for delicate flowers and insects, especially butterflies. Use No. 3 for large solid articles, such as baby shoes and vegetables. After articles have been plated with copper they may be plated with silver by the regular "Electro" process in common use, or the formulas given below which are cheaper and just as satisfactory. To plate with Silver, Silver Chloride 60 grains, Cream of Tartar 300 grains, common salt 120 grains. Mix all well and reduce to a fine paste with distilled water; cover articles with this paste and let dry, then rub off with powdered chalk and polish. Insects, millers, etc., make beautiful brooches and hat pins, the latter when mounted on a fine wire coil spring appear more lifelike; a good grade of water colors may be used to an advantage on these. The bath given after Formula No. 1 is suitable for all formulas, but one needs practice to become efficient. The formulas are correct."

A BUTTERFLY STORY.

By R. R. Rowley, Superintendent of Schools, Louisiana, Mo.

"While wading through the underbrush on a hillside forest last Thursday (June 11th), we spied, some distance ahead of us, a flimsy-looking web attached to two small trees, some six or seven feet apart, decorated with black-looking spots, quite regularly arranged, much as spots in a veil. What was our surprise when we reached the objects to find 26 specimens of *Thecla calanus* fast in a spider's strong, sticky web, every one of them alive and struggling but firmly enmeshed and rendered helpless. No spider was in sight. We had seen an occasional *calanus*, but this was the largest number I ever saw together. What allured

them to this spot and why had not the spider killed some of them? Perhaps he was not at home, but what had happened to him? Everything went to show that several of the butterflies had been prisoners longer than one day. I recalled the poem "The Spider and the Fly" and wondered if the spider in this case had used flattery on the silly little butterflies or had he an eye for living decoration with no desire to destroy the unfortunate spots in his veil and ruin the struggling effect. This was an unusually large web extending from the ground up nearly four feet. There were no other insects in the trap. It was a butterfly trap."

HISTORY OF THE DONNER PARTY.

The Donner Party consisted of about eighty people, one-half of whom perished in crossing the Sierra Nevada Mountains in 1846-7. My father wrote the history in 1879 from information obtained by personal interviews with the twenty-six survivors then living. Nine editions have been published. I will send the book, cloth-bound, postage prepaid, to any address upon receipt of the price, \$1.00.

Has completed its sixth volume with a sixty-four page number, beautifully illustrated with cover in three colors.

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CORRESPONDENCE COURSE IN ENTOMOLOGY.

Conducted Under the Auspices of the Agassiz Association.

Lesson XII. Miscellaneous.

WILL OTHER FARMS INJURE MINE?

Correspondents often express the fear that if they start farms my business will suffer. I wish to effectually lay this ghost. I have been trying for two years to induce people to start butterfly farms. I know of nothing which would bring so much joy, beauty and sunshine into their lives. I want every pupil to instruct every beginner who wishes to learn the business. During the past twenty years it has been extremely difficult for amateurs to get adequate help in entomological work unless they wished to confine their studies to injurious insects. Instead of teaching how to rear moths and butterflies the scientists taught to destroy them by rearing their enemies. I should be proud and happy to be the means of causing a thousand prosperous butterfly farms to be built up in America. Prices would be lowered of course, but markets would be greatly multiplied. Those of us who have moderate means or almost no money at all could afford to own splendid collections. We could help each other fill orders and be of mutual assistance. Hardly a day passes that I do not receive letters asking for species which cannot be obtained in Truckee. If we had a chain of well-managed farms there would be no difficulty in supplying the wants of any dealer or purchaser. A long life and an exceedingly happy one awaits each person who makes entomology a hobby. The work is brimful of health, of exquisite delights, of constant enjoyment. No one can properly conduct a farm without receiving eggs, pupæ and imagoes from other farmers. Each locality has its treasures which cannot be obtained elsewhere, hence there is abundant room for all. I would like to correspond, exchange with and purchase from each butterfly farmer in the world.

DIFFERENCES BETWEEN BUTTERFLIES AND MOTHS.

The antennæ or horns of a butterfly have a knob, ball, or a decided thickening at the end, while those of moths are not knobbed, but usually taper from base to tip and terminate in a sharp point. Some moths have fern-like antennæ, quite broad in the middle, but always terminating in a point. The butterfly's antennæ are thread-like, except for the knob at the end. While resting or sleeping the wings of the butterfly are erect over its back, while a moth commonly rests with its wings folded together like a fan, the upper wings covering the tail and underwings. The butterfly always flies in the day time and generally in the morning hours. A few moths fly in the day time, but the larger number after sunset in the evening and during the night. It is impossible to give any rule which does not have exceptions, but when a moth resembles a butterfly in some respects you can readily tell the difference from its shape, the thickness of its body and the fact that its antennæ are not clubbed. Harris says that butterflies never pass the winter in the egg state, moths rarely in the fly state.

SEX OF MOTHS AND BUTTERFLIES.

Every beginner is unnecessarily perplexed over the question of how to tell the sex of moths and butterflies. Experience enables one to tell most forms at a glance, but it is difficult to state a general rule for distinguishing them. When I want the eggs of a particular species and am not sure about the sex I never hesitate about putting a number of specimens in boxes. If some of them oviposit the experiment is a success. If some of them prove to be males I have at least prolonged their lives. In many moths and butterflies, for example *Citheronia*

regalis and the Papilio, the male can be told by its claspers. Its tail terminates in a cleft somewhat like the foot of a deer, on a very small scale. Females of Parnassius, after mating, have a curious abdominal pouch, white and hard. In moths the males of many species have broad antennæ, slender abdomens, sometimes claspers, frequently tails terminating in a tuft of hairs, and always the males have the single frenulum. Of course the microscope and dissection will in all cases settle the question of sex. There are forms in which the body of the female has three segments and that of the male four. The bodies of males are slender when viewed from above, the bodies of females broader and larger. When distended with eggs the bodies of the females can be told readily. By examining a number of specimens of a given species the pupil can usually separate the sexes. In nearly half of the butterflies the colors of the sexes are different, as for instance in the Colias. In the Pamphilas the upper surface of the wings are often different, though the under sides are similar, but in all the other Hesperiidæ it is very difficult to determine the sexes without dissection and the use of the microscope.

BLOWING LARVÆ.

Nathan Banks, "Directions for Collecting and Preserving Insects." "The larvæ should be killed in a cyanide bottle or in alcohol. Cyanide is generally considered the best for most larvæ. The caterpillar is placed on a piece of blotting paper, a pencil is rolled over the larva from the head to the tip of the body, thus protruding the tip of the alimentary canal. This is snipped off by a pair of scissors or a sharp knife, and then by rolling a pencil, as before, a number of times over the larva the contents are squeezed out of its body. One should be careful to do it rather slowly, at least with delicate larvæ, so that the skin is not broken, for if rubbed too hard or too long the pigment may be removed from the skin. The caterpillar should be moved about on the blotting paper during the operation, so that it is not soiled by its own juices. A glass tube with its tip drawn out to a fine point is then inserted into the anal opening. The skin may be fastened on the slender point by a bit of thread or a drop of glue. If the glass tip fits rather tightly into the aperture the skin may be placed a moment in the oven and then withdrawn. This will stick the skin to the end of the glass. A spring or clasp of steel may be so arranged as to hold the larva to the tube, or the skin may be held to the glass tube by a common insect pin bent around the tube and then forward, with the tip recurved. One may inflate the skin by blowing in the tube; but a more effective way is to have a rubber tube on which is a large rubber pneumatic bag and a smaller inflating bag at the end. By squeezing the inflating bag the larger bag becomes inflated, and this makes a steady pressure upon the larval skin. This operation of inflating the larva should be performed over a small tin oven."

HOW TO SEARCH FOR LARVÆ.

Herman H. Brehme, Newark, N. J., writes:

"In many cases larvæ hide during the day and feed at night. This is the case with most Sphingidæ. It makes it rather tedious to find them, but if the plant shows traces of feeding the larvæ are surely not far away and in most cases can be found at the base of the bush or on the underbrush, weeds and stems of grasses. It is best to look for the hiding larvæ, as they are ninety-nine times out of a hundred free from parasites, while larvæ of most of the species which are found close to the tops of the plants are parasitized, as the larvæ after being stung do not care to hide any longer. It seems as if they know that they are doomed and their life is short. On the other hand many larvæ of butterflies and a few Sphingidæ do not hide, that is they do not go to the ground after feeding,

but lie right under the leaves and sometimes close to the twigs and stem. Arctia larvæ as a rule hide and are generally hard to find. They are low feeders and walk away from their food to hide. An easy way to get them is to look for plants where they have been feeding, and when such plants have been located the larvæ can be looked for in two ways, one is to use a light at night while the larvæ are feeding and the other is to lay heavy brown paper close to the food-plants. Nine times out of ten the larvæ after feeding will go under the paper to hide, and it is an easy matter to pick them up the next morning. Some Catocalas can be gathered in the same way, while others can be found between the ridges of the bark on trees. The best time to look for hiding larvæ is on dark cloudy days, when the larvæ in most cases do not leave the plant. Sometimes they can be found right where they have been feeding during the night. Such conditions prevail on rainy days as well. The large Saturnidæ as a rule do not hide and these are prey to the parasites. It is often the case that ninety out of a hundred *Attacus cecropia* are parasitized."

WORMS THAT CARE.

J. M. Aldrich, 238 South Grant St., La Fayette, Ind., writes: "About the worm that cares, I well remember making a similar observation on the Sessid borer of white ash in South Dakota many years ago. The larva when full-grown bores to the surface, but in that case leaves a very thin scale of the outer bark undisturbed, so there is just the slightest discoloration visible on the surface to mark the circle that has been eaten away, but the adult can easily push out, leaving the pupa-skin in the hole. I like to think that the worm does care; at any rate the purely mechanical explanation in vogue seems to me to cast a little reflection on all life, including our own."

THE SPECIES OF PARNASSIUS.

J. Henry Watson, 70 Ashford Road, Wittington, Manchester, England, says: "Now as regards Parnassius, M. Wright was one of my correspondents and I possess from him types of the forms which he named as species as well as types from him of Edwards' forms which had been verified by Edwards himself. These particular insects are at Mr. Rothschild's at present on loan. I shall be there soon and get them back. There are but three species of Parnassius in N. A. *Eversmanni* which I do not possess from America; *Clodius* and *Smintheus* which is only a form of the European *Phœbus*. There are many forms and geographical races, and I received at least three forms of *Clodius* from Lake Tahoe. I note your remarks on foodplants and will give you a list of foods I have reared your American Saturnids on in England."

CARE OF COCOONS.

Robert Dickson, 804 Duquesne Way, Pittsburg, Pa., says: "Take regulation flower pots, from the smallest to the largest sizes, put gravel in each for drainage, fill them with good fine soil, put the pupæ or cocoons on top and then get tin rings of suitable sizes to fit in the inner edges of the pots so they can be pressed into the soil. These rings are something like a tomato can without top or bottom and need not be more than three or four inches high. In them, above the cocoons, I place a few twigs so that when the moths emerge they will have something to cling to. Over the top of the rings place strainers or netting as covers. I prefer strainers for they are easily removed. Under the flower pot put saucers which are to be filled with water once or twice a week. This gives perfect moisture. It is not the dry air at the moment the moth emerges which causes the wings to shrink up, but the lack of moisture during the entire pupal stage. If you follow these directions you will obtain good results."

MOTH TRAPS.

All collectors testify to the value of moth traps. Dr. William Barnes says: "To get a good representation from any locality one must work night collecting as well as sugaring and also day collecting, on flowers and other things." A lamp set close to a closed window will often attract rare specimens, which may be taken outside the glass, or they may fly into the house, if the window be open, or be gathered on the show-windows along a sidewalk or around electric lights. All traps are constructed upon the principle of the light in the window. They usually consist of an oblong box, one end of which contains a lamp and reflector, and the other end is open and contains a couple of panes of glass which reach from the bottom of the box to within a couple of inches of the top. The panes are separated by a space of three or four inches, incline inward at an angle of say forty-five degrees, and their edges rest in grooves in the two sides of the box. A third pane of glass forms a partition in the box in front of the light, and just in front of this partition is a circular hole in the bottom board of the trap, in which fits the open mouth of a cyanide jar, or a funnel leading down to the jar. The moths climb up the inclined surfaces of the panes of glass, fly to the partition and drop into the bottle. All the supply houses sell moth traps, but after seeing one any carpenter can duplicate them.

EFFICACY OF TRAPS.

The late L. E. Ricksecker, of San Diego, wrote me: "I cannot sugar here, for there are no trees to sugar on. I am using lantern traps and my catch in one year was twenty-five thousand specimens. Of course there are many thousand *Micros*, but they were all sold." Dr. William Barnes writes: "Some of our collectors use a trap a good deal and catch an immense number of *Micros*. It is no special effort to collect them, one merely fixing the trap at night and in the morning pinning up or laying the specimens between layers of cotton. They very often get from five hundred to a thousand specimens a night."

A HOME MADE NET.

Elizabeth Lowrie, Mission San Jose, California, has made the following excellent net: "The handle is a fifty-cent shotgun rod, the joints of which screw together. A wire swab screws into the ferrule at the end, but we removed the swab and soldered the screw to the loop of heavy wire. Any plumber can make the loop and attach the screw or it can be done by a handy man at home. Of course there are cheaper gun rods. This net frame, while strong, is much lighter than those sold by the supply houses."

SUGARING MIXTURE FOR DRY TOWNS.

Miss Lowrie adds: "I find that when I make a mixture of berry pulp, from which jelly has been made, and molasses, and spread it on the trees the moths come better than when I use the beer mixture. I have used apple pearings and plums cooked and mixed with molasses with some of the beer mixture added just before using."

A HANDY MORGUE.

Miss Lowrie also adds: "We have a very handy 'morgue' made of a Cotto-lene pail well paraffined before the cyanide was put into it. It is light to carry about and the cover fits tightly. We also use powdered milk cans and jelly glasses with tin covers for small cyanide receptacles. My brother has set glass in the covers of some of our cans so we can see when a fly is ready to be put into the morgue."

SILK CULTURE A HOME INDUSTRY.

Mrs. J. D. Murphy, of San Francisco, President of the Ladies' Silk Culture Society of California, writes in "Orchard and Farm": "In all countries where the silk industry flourishes the work is mostly done by women and children, it being essentially a home industry. The worm is the product of a tiny egg, laid by an insect known as the silk moth; one ounce of these eggs will produce from 35,000 to 40,000 worms. One ounce of eggs will produce 16 to 22 pounds of silk, according to the care in feeding the silk worms, the better the food in quality and quantity the better the silk will be. The latest quotation from the Italian silk market is from \$4.70 to \$5.20 a pound. We will now estimate what the cost would be in raising 32 pounds of silk at the lowest figure.

Two ounces of eggs, the finest procurable, the labor and the leaves provided by home industry.....	\$5.00	
The reeling, \$1.25 a lb.....	40.00	
		\$45.00
Silk, 32 lbs. at \$4.70 a lb.....	\$150.40	
Eggs and reeling.....	45.00	
Profit		105.40
Say incidentals \$5; profit.....		100.00
At the highest price, profit.....		150.00

One woman and a boy could raise this silk in about six weeks. If there are plenty of leaves to feed the worms the work could be continued to September, or as long as the leaves flourish."

Mrs. Murphy writes me: "Until California is well supplied with mulberry leaves, to feed the worms, instructions to raise them are useless. I hope you will use all your influence to get your people to raise mulberry trees. Your Supervisors should plant trees on the highways and raise money to care for them. A dozen mulberry trees grown on the river bank or along the country road will form the basis of a profitable industry for a good-sized family. Raw silk brings a good price and is always in demand. The machinery for reeling is cheap and simple and may be worked by hand."

SPREADING BUTTERFLIES FOR MOUNTS.

In spreading butterflies and moths for the "Ximena McGlashan" or similar mounts you do not need spreading boards. Any smooth thin board, such as a cigar box cover, or even a piece of heavy cardboard, a few pins and a spreading needle is all that is required. Glazed paper pasted on the board gives a smooth surface. Pin the insect through the thorax from the underside, with its back downward. Spread the wings and lay strips of glass upon them. To hold the body in place stick a pin on each side between the thorax and abdomen and if necessary stick a second pair of pins at the neck or in front of the wings. To press the legs down close to the body pin strips of paper across them each side of the pin. This is the method recommended by Clifton F. Hodge in "Nature Study and Life."

TO REMOVE THE PIN FROM A SPECIMEN.

When you wish to place a specimen in a Riker, Denton Brothers' or Ximena McGlashan mount, if the butterfly has been spread, you must remove the pin. To do this grasp the head of the pin firmly and rest the point upon a table. Take hold of the pin above the insect with the jaws of your forceps, and slide the forceps down until they rest upon the thorax. Gently but firmly press the body of the insect downward, meanwhile keeping the forceps closed upon

the pin. Sometimes the body adheres so firmly to its pin that it will crush or be disfigured, however carefully you press down. With such specimens there is nothing to do but relax them slightly, remove the pin and insert a smaller one, again spreading the insect if necessary. A very large part of your specimens, however, can be removed from the pin by means of the forceps without relaxing.

SEALED JARS FOR PAPERED SPECIMENS.

Sarah Brown, daughter of John Brown, of Ossawatimie, lives at San Jose, California, and finds it almost impossible to preserve her papered specimens from dermestis, and invented a method which is perfect. She places the papers in "Mason" fruit jars, screwing the tin tops firmly down upon the rubber gasket. The covers should remain loose until the moisture in the bodies of the insects has evaporated. A few drops of carbolic acid will prevent mold and a few naphthalene flakes or a moth ball as an additional precaution may be placed in the bottle. Neat labels containing the names of the specimens and any desired data are pasted on the outside of the bottle.

CLEANING BEETLES.

Robert J. Sims of Jefferson, Ohio, writes: "If beetles are dirty they may be dropped into a cup of water containing a little peroxide. They will sizzle for a few minutes and then be quite clean.

STORING COLEOPTERA.

Mr. Sims says: "Quantities of Coleoptera, caught all in our locality and within a week or so, may be stored in large bottles of denatured alcohol, with proper label and date on each bottle. Specimens kept so, indefinitely, are all ready to mount without relaxing. Delicately marked specimens like *Cicindela* are apt to discolor and are better stored dry."

SUGGESTIONS TO CORRESPONDENTS.

I am now writing to 2,500 people who are interested in butterfly farming. I give each a number in the order in which the correspondence begins. If you will place the same number at the head of your letter which I place at the head of those written to you it will assist me, as my system of filing letters is partly based on these numbers as well as upon the alphabet.

When you wish insects named send perfect specimens in papers or pinned. If the wings are properly spread you can receive names by return mail, unless the determination is difficult. Sometimes it is necessary to send a series, as there may be slight differences in coloration.

Never send a specimen in a letter. Do not send pinned or spread specimens in a single box without an outer covering of excelsior. It is better to use an inner and an outer box with at least an inch and a half of space between filled with excelsior. The bodies of large moths should be secured by a wisp of cotton about half an inch wide placed over the body and pinned down at each end of the cotton. Pins should be placed on each side of the abdomen of the large Sphinx moths to prevent the bodies from sliding around on the pins. Always put your name and address on the inner box and if possible attach it to each specimen.

In exchanging specimens send perfect insects. The butterfly farmer has no excuse for having imperfect specimens in his possession. As soon as I can afford to do so I will exchange with any correspondent. While paying my way through college I must sell my specimens.

I am far too busy to carry on a general correspondence with any one. It takes all my time to instruct my pupils in butterfly farming. I am duly thankful

for numerous proposals of marriage and other sentimental effusions from men who are total strangers, but they must accept this printed acknowledgment in lieu of a reply.

NAMES OF DEALERS AND PURCHASERS.

In the lists of the names of dealers and purchasers which have been published in these lessons are addresses of the men and firms from whom the beginner will be apt to receive kind treatment. Hundreds of other names could be furnished, but as a rule they would be of people who would purchase none but rare specimens. You should never write to a dealer until you have a correct list of the perfect material which you propose to sell. It is sheer nonsense to write: "I am going to catch some butterflies; what will you pay for them?" Yet this is rather a common question in the letters I receive. One might as sensibly say to a publisher: "I am thinking of writing a book; what will you pay for it?" Or to a produce dealer: "I have bought a tract of land and intend to raise fruit and vegetables; what will you pay me for them?" Until you can prove that you have absolutely perfect specimens and know how to ship them safely no dealer will purchase butterflies and moths. I shall at all times be glad to assist any pupil in disposing of his output and will pay cash for specimens which I need in filling orders.

Do not offer material for sale or annoy purchasers until you have a quantity of absolutely perfect specimens, properly named, and can furnish samples of what you have to offer. If you will write me what you have to sell I may be able to assist you in finding cash markets.

F. H. Wolley Dod, Midnapore, Alberta, Canada, will pay cash for fifty specimens of each species of moths in Dyar's List from 976 to 3080 inclusive, giving five cents per specimen.

Dr. William Barnes, 152 E. Prairie St., Decatur, Ill., purchases for cash, in large quantities, such species of moths as he desires.

J. G. Duthie, editor "Canadian Thresherman and Farmer," Winnipeg, Canada, will purchase large quantities of moths and butterflies for cash.

Ward's Natural Science Establishment, 84-102 College Ave., Rochester, N. Y.; The Kny-Scheerer Co., 404-10 West 27th St., New York, N. Y.; Herman H. Brehme, 74 13th Ave., Newark, N. J.; William Reiff, 366 Arborway, Forest Hills Station, Boston, Mass., are prominent dealers in Lepidoptera.

C. D. Peacock (per A. Brady), Jewelers, State at Adams St., Chicago, Ill.; Radke & Co., Jewelers and Silversmiths, 219 Post St., San Francisco, Cal.; Miss A. M. McDowell, 327 Charles St., North Baltimore, Md.; Margaret Blake, 255 Franklin St., Buffalo, N. Y., have each written me recently for quantities of specimens for art work.

All subscribers for *The Butterfly Farmer* will from time to time in the future receive additional names of dealers and purchasers, upon request.

DR. VAN DYKE'S SUGARING FORMULA.

Dr. E. C. Van Dyke, Professor of Entomology, University of California, Berkeley, Cal., furnishes the following most excellent formula for sugaring for moths:

"Brown Sugar $1\frac{1}{2}$ pounds, Beer (stale) 1 quart, Jamaica Rum 4 ounces, Banana Oil 1 dram. Banana Oil is rather difficult to obtain, but it is most essential for best results."

OBSERVATIONS UPON THE EGG STATE.

"Write down in your note book how the egg is laid; whether unattached or attached, and if the latter, by what means, and also by what part of its surface; the position of the female and of her abdomen at the time of laying, whether hovering, at rest, or in what other act; whether the eggs are laid singly or in batches, and if the latter, the number, and whether unarranged or how arranged; the total number deposited; and whether nude or covered, and in the latter how covered or protected, together with any exceptions, individual, special, natural, or abnormal; when laid, at what date or dates, at what time of day or night, at what intervals, how long after mating, how long after emergence of the female, noting also exception; where laid, if not on the food-plant, where; if on the food, the exact position, as well as exceptional instances which may come under notice; the duration of the egg state, in species and in individual cases; influences of temperature, soil, locality, altitude, time of year, etc., which promote, retard or modify the natural changes; the appearance of the egg itself, as to form, color or colors, markings, elevations, depressions, sculpture on the surface, together with changes, normal as well as irregular, from the time of exclusion to that of hatching." H. Guard Knaggs, M. D. F. L. S. in "The Lepidopterist's Guide."

HELP PREPARE FOODPLANT LISTS.

Scientists, collectors, and especially all butterfly farmers, are earnestly requested to assist me in the preparation of perfect foodplant charts. It is a work which may require years to accomplish, and I take this opportunity of impressing upon the minds of all who are interested that I wish all the help that I can receive. Every time you succeed in rearing larvæ by feeding them the leaves of foodplants not given in the charts kindly give me exact data on the subject. I have a considerable number of the Foodplant Charts which I will send upon request to any address. I will be sincerely grateful for corrections from botanists or entomologists, and for each addition or suggestion which can be made. Never before in the history of entomological work have so many people become interested in rearing butterflies and moths from eggs and larvæ, and perfect foodplant lists will be of incalculable benefit to all these butterfly farmers. Intense interest has been awakened in this method of obtaining perfect specimens and I predict that this interest will continue to increase each year. Nearly every one will make some discovery in the matter of foodplants which will be of value to others, and I will consider it an honor to assist in compiling and publishing these discoveries.

IN CONCLUSION.

I have tried to instruct beginners in plain, simple language, upon all matters necessary to enable them to engage in butterfly farming. Scientific books can be consulted when one seeks advanced knowledge of entomological work. The study of the life history of the larva is an important branch of this advanced work which each pupil is urged to master, but it would merely confuse a beginner. In selecting material I have been guided by the belief that what was useful to me would be useful to other amateurs. My greatest aim has been to inspire a love for the beautiful in entomology. I think this is why my work has attracted attention and why it has received widespread publicity. My greatest wish has been to add happiness and sunshine to the lives of my pupils. This earth is one of the stars and a part of heaven.

Address all letters:

(MISS) XIMENA McGLASHAN,
Truckee, California.

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